FLAAR Reports

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October 2008

High Quality UV Printing

IP&I Cube260
UV Printer

CONTENTS

Please Note

Introduction

You quickly notice that this printer is not made in China. It is designed, engineered, and manufactured in South Korea. The difference is substantial. Even the brochures are as sophisticated as you would expect from a printer manufacturer in Switzerland, Austria, Germany, or the US. Indeed the brochure is a fully professional level of graphic design. The printer is an equally professional level of craftsmanship. The print quality is excellent.

The first editions of this report were based on inspection of the printer at countless trade shows in Europe and the US. The first substantial update includes information from a factory inspection report based on three days in Korea. Following this it was possible to ask additional questions again in Korea during autumn 2008.

In each printshop, they had bought a second printer from IP&I after experiencing their first printer. People only buy a second printer of the same brand if they like their first experience. This is the best recommendation for a printer that you can find, that a printshop owner will want more.

To acquire the knowledge that goes into these reports requires visiting print shops, manufacturing plants, demo rooms, and visiting trade shows (so we can compare printers all in one place over an intense several days). Our university pays none of these costs, so to make it possible to keep being able to provide educational material to our readers, we request sponsorship funding. We also appreciate it when the transportation costs to trade shows and learning venues are provided (otherwise we would be stuck on our dull campus like most other professors). For example, it would not have been possible to get to the factory without the company contributing to the transportation and hotel. The lack of university funding is why there are no other professors doing what FLAAR is accomplishing (a main reason is that FLAAR is independent, so we can be more innovative).

Although FLAAR is non-profit, the graphic designers who work hard to prepare this PDF for you from Nicholas's notes, and the web designers who create the web sites that attract over a 270,000 readers per year, all appreciate receiving at least a modest salary.

A small portion of our operating costs comes from selling the FLAAR Reports. But our readers don't always know what to expect, so a new agenda is to make a sample of our reports available free. So this year we are starting this new program, to request a subvention (grant) from respected members of the wide-format industry to cover the base cost of issuing the reports so we don't have to charge for them. We list every company that provides a grant in the open documentation at the end of each report that has a grant. For us, the subvention allows more people to learn more about UV-curing inkjet chemistry and technology. That's our goal: to assist as many people as possible to learn from our experience.

The larger universities with major print training programs, such as RIT, Cal Poly, Clemson, etc, receive industry support directly, especially donations of million-dollar offset, flexo, and variable-data printing presses, endowed professorship funds, research funding, etc. BGSU has no such source of income. So FLAAR has to do this kind of fund raising on our own (especially since we were working with wide-format inkjet printers for many years before affiliating with BGSU). Rather than working with Heidelberg or offset press manufacturers etc, we specifically limit ourselves to wide-format inkjet printers (plus scanners, digital cameras, and related digital imaging equipment).

During the coming six months we hope to add additional sponsors so that more of our reports can be available to a wider audience. This is especially necessary since the university has cut back so far that industry support is increasingly essential (the State of Ohio has lost so many manufacturing plants to off-shore, especially China, that tax revenues are no longer sufficient to support state-funded universities). By the time of DRUPA 2008, we wish to be completely independent of falling (and failing) state support.

THE BASICS

1. Brand name, model?
The IP&I Cube260 was the name of the model shown at ISA 2006.

2. If there are two or three (or more) widths of this printer, what differences exist other than the width?
Originally there was also a narrower width available. But since the cost to manufacture each width was effectively the same, it was not cost effective to manufacture the narrower width. So the narrower width model was dropped.

3. What is the nature of the company? Is this company the manufacturer, distributor, or rebranding a machine made by someone else?
International Printer & Ink, IP&I, is formed from the former head engineers and personnel from the breakup of Hypernics. Since Hypernics never exhibited under its own name in any trade show in Germany or the US, I never had first hand experience with them. But Hypernics was the manufacturer for printers sold in the US as Azero Creon, and the manufacturer of printers sold in Eastern Europe by Azon. I inspected Azero Creon UV printers at two or three trade shows in the US during the years that this company exhibited (circa 2002-2003 if I remember correctly).

About 2004 Hypernics disappeared from the scene. IP&I was incorporated that same year. Their website is www.ip-i.co.kr.

Nicholas checking the IP&I Cube260 at FESPA Mexico 08

Hypernics had one of the most advanced UV printers in the world at the time of their demise. The reason the company folded was not because of the printer itself; the company lacked operating capital. And the general public was so upset with poor quality of Chinese printers of that era; no one understood the difference between a Chinese printer and a Korean printer. In these specific years (2004-2005) there was a systematically poor to miserable track record (over 90% of the Flora UV printers made in that era were rejected and returned by their buyers or beta testers, both those under DuPont contract manufacturing as well as those retrofitted by Raster Printers). Every single US or major European company that attempted to sell Chinese solvent printers dropped them totally in these years (2004-2005): Gerber, Matan, and 3M.

Redhilll, with all their experience from VUTEk, and with plenty of Chinese access, was equally and totally unsuccessful in selling Chinese solvent printers, even though they tried improved brands after the original brands proved unreliable. Redhill subsequently, effectively, went out of business.

Although Chinese printers today (2007-2008) are greatly improved, even at Shanghai trade show 2007 and again in 2008, there were UV printers of some brands, such as Creation, that were most politely described as rudimentary.

So there is no misunderstanding: there is a significant difference between printers made in China, made in Taiwan, and made in Korea. Sprin went out of business for some of the same reasons as did Redhill: they tried to utilize Chinese solvent printers (and the Chinese printer manufacturing philosophy of cheapness) in those years (2003-2005).

Today, in 2007, much has changed. One or two Chinese UV printer brands are improved to the point that distributors are taking a second look. Since FLAAR needs to check, in person, we are beginning a program to visit Chinese factories and to visit Korean factories and to visit Taiwan factories. So far have visited three in China and IP&I is our first visit in Korea. This is a real eye-opener. The Korean manufacturer is putting as much dedication and attention to quality as you find in Europe and the US. Korea is not a low-bid country; their goal is not to produce a machine whose main feature is cheapness.

4. What other printers are the same or similar chassis from this manufacturer or distributor?
It would be logical that the Hypernics engineers used their previous experience with the Azero Creon UV printers as a basis for their Cube260. These earlier printers are the Azero CreoJet 8250, CreonJet UV1600, Azon UV-Jet 2500-R 2W, Hypernics UV-FR2513, and Hypernics HyperJet UV-F2525.

An interim model (sort of half Hypernics, half IP&I, was the Cube Revo. Actually much of the concept that Hypernics was working on (the Revo) came from Fuji Korea.

Yet the newer Cube printers have improvements in crucial aspects (see below).

5. What other printers of other brands are comparable?
The several Dilli printers immediately come to mind, as does the GRAPO Octopus. FLAAR Reports are available on the Dilli (and separately on the Agfa :Anapurna which is a slightly modified Dilli). A comprehensive evaluation is available in the FLAAR Reports on the Octopus because we had several days access to inspect these GRAPO printers at their factory. The IP&I is in some respects more sophisticated and definitely has more features than the GRAPO (whose main benefit is it's simplicity).
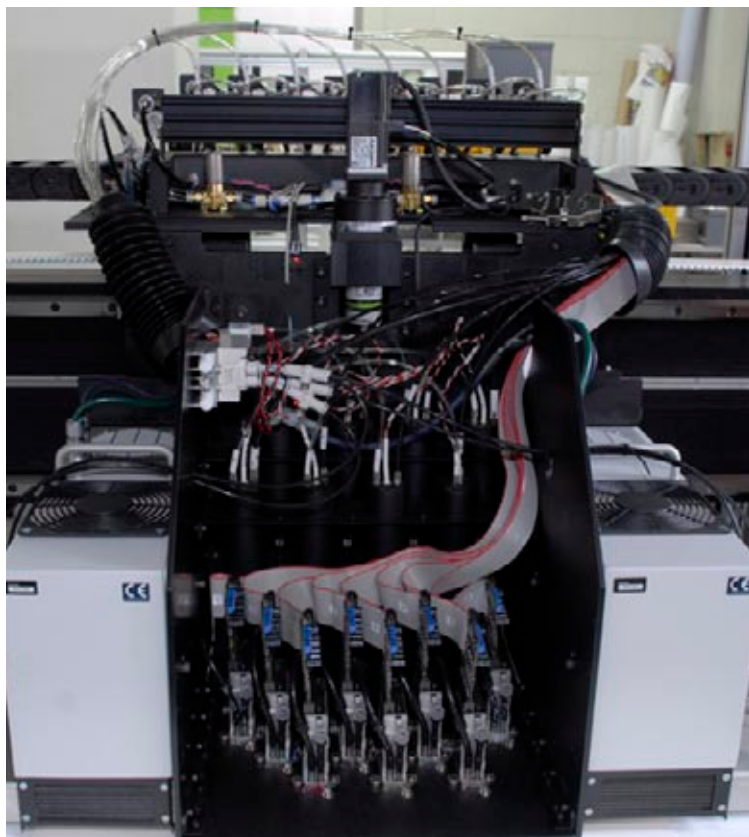
The IP&I 260 offers CMYK+lc,lm+W+flush, a total of 8 channels.
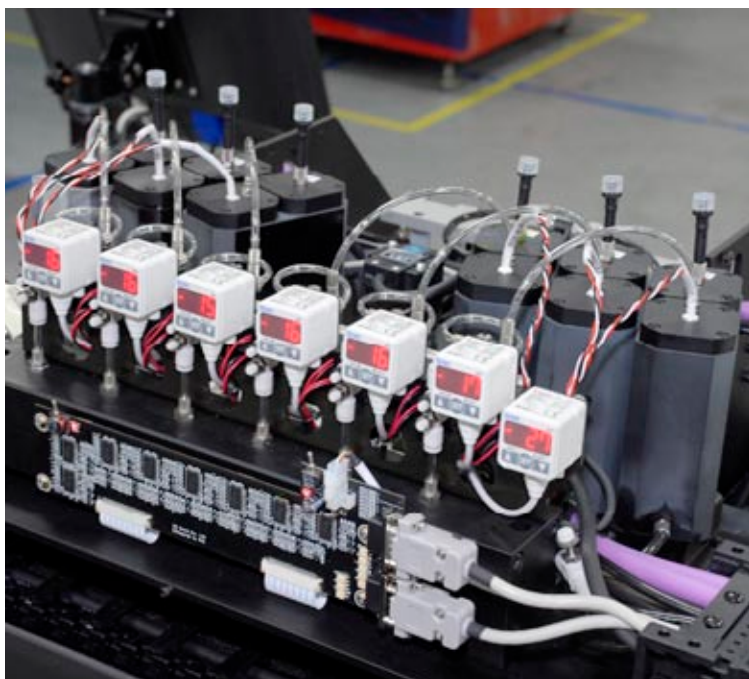
The 1606F has six channels: 4 colors+2 whites

6. How does this model compare with comparable previous printers?

The Cube260 is improved in dramatic ways as compared with the earlier Azero Creon. As but one example, the Hypernics printer used Toyo ink with a 44 picoliter drop; the Cube260 uses Sun ink with a 14 picoliter drop.

There is also a Cube 1606F and 1606S. These are also combo style, but have no hood or upper compartment, and have 6 ink channels (plus flush). To use white, and flush, and all six colors, you need 8 ink channels.

Compare the 8-channel CUBE 260uv with the CUBE 1606F; the latter is 4 colors+2 whites so the 1606F model offers 6 ink channels not 8.

7. When and where was this model first introduced?

The first time I saw the Cube260 was at ISA 2006. I did not hear about it being exhibited at IPEX (held the same week in Birmingham, England).

8. Is this printer mature or still in alpha-stage or beta-stage?

The printer is fully functional and is ready to ship. I have inspected two printshops that have this IP&I Cube260uv printer. Both are using it successfully; both are content.

9. List price?

$200,000, depending on accessories.

10. What accessories are extra charge? Are these same or similar accessories included with other printers at no extra cost?

"Media loading system and roll take-up device" are listed in the supplementary IP&I literature, without giving further detail.

11. What other costs are involved?

Anti-static system is an option.

12. What other equipment is needed to operate this printer? For example, does this printer include its own power line conditioner? Do you need an uninterruptible power supply (UPS)?
It is helpful when a User's Manual is clear and up front about reality, since in many countries the electricity fluctuates (even in the US). So you may need a constant voltage regulation unit. Do not confuse this with a UPS unit. That you may also need, but it's a separate machine.

13. Is an air suction system needed to be installed as a separate item, or is all the vacuum table or other vacuum requirements already included in the printer itself?
The printshop must provide compressed air.

14. Is it recommended, or required, to buy a spare parts kit? Or extra printheads?
It is not necessary or expected for an end-user to buy spare parts up front. Your dealer or distributor already is supposed to have these spare parts available for you.

With a few brands, such as VUTEk, it is expected that you purchase spare parts, $20,000, on top of the price of the new printer.

15. Or do the dealers prefer that customers not try to make their own repairs?
The end-user is not encouraged to take the printer apart and do repairs on their own.

This policy varies by manufacturer. Interest in doing their own repairs varies by the end-user and by the printer operator. A few operators like the opportunity to take service training at the factory and thereby to be able to do basic repairs on their own. Most manufacturers discourage this, but some manufacturers do allow end-users to take advanced service training.
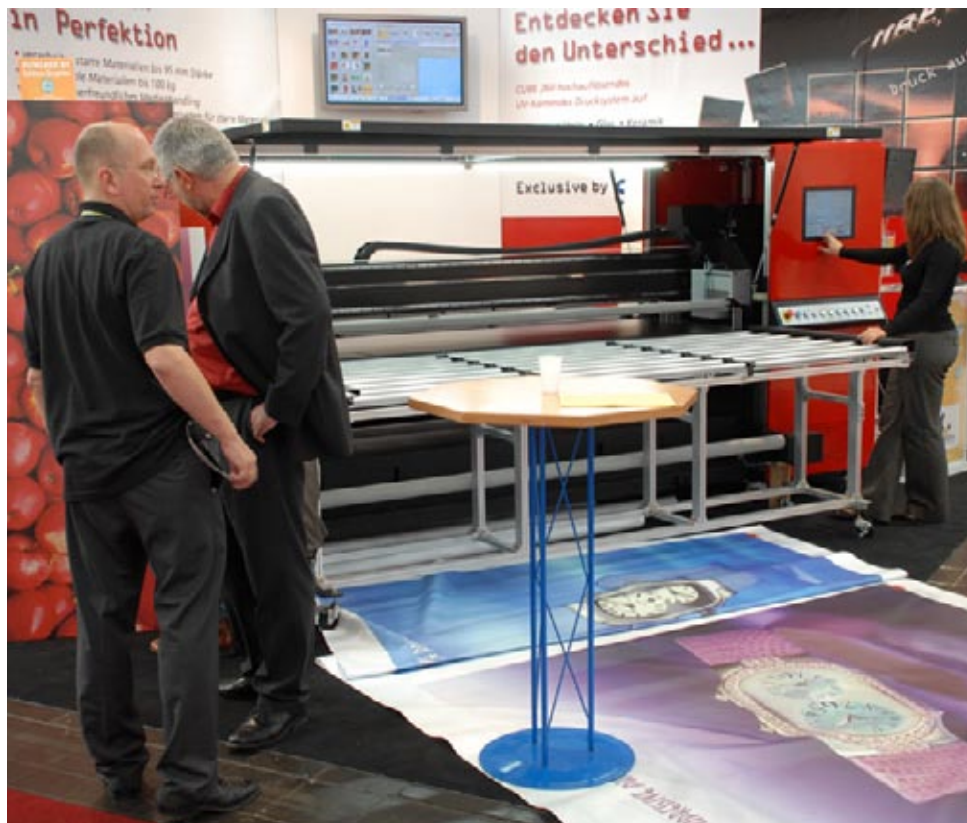
The company does not encourage the customer to repair the printer by himself, due its complicated components.

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PURCHASING

16. Are dealers national (most companies) or regional (Roland allows a dealer to operate only within a limited regional area)? Does a buyer have any choice in dealers?
Dealers for printers from Asia tend to be national, since rarely is there more than one dealer or distributor per country.

STRUCTURE OF THE PRINTER: Vacuum

17. Is there a vacuum function?
Yes.

18. Is the vacuum created by simple fans, or by an air pump?
The first generation model had fans; the current generation model Cube 260 uses a vacuum air pump.

19. In how many sections?
Four sections.

IP&I Cube260 at the manufacturing plant. You can see the two levels of the vacuum system, "FULL" and "HALF"

STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path

20. Is this a dedicated flatbed with no roll-to-roll capability? Or is this a true flatbed or just add-on feeder platforms at front and back?
This is a flatbed conveyor belt system with add-on tables. Roll-to-roll is built in.

21. Was this printer made originally as a UV-curable ink printer, or is it retrofitted with UV-curing? If retrofitted, what was the original brand or model?
Originally made as a UV-curable printer.

22. Is there a moving transport belt (combo style) or a stationary platen (hybrid style)?
This is a combo style printer with a conveyor transport belt. There is no traditional platen.

STRUCTURE OF THE PRINTER: Transport Belt

23. Describe the transport belt? What material? What manufacturer?
The weave of the conveyor belt is not obvious; the weave is not part of the structure or surface texture. With the Dilli and Vutek belts, the weave is part of the surface structure.

A woven structure, such as that of these others, causes them to warp, noticeably. The IP&I transport belt is rigid, so the belt itself can't flex out of position.
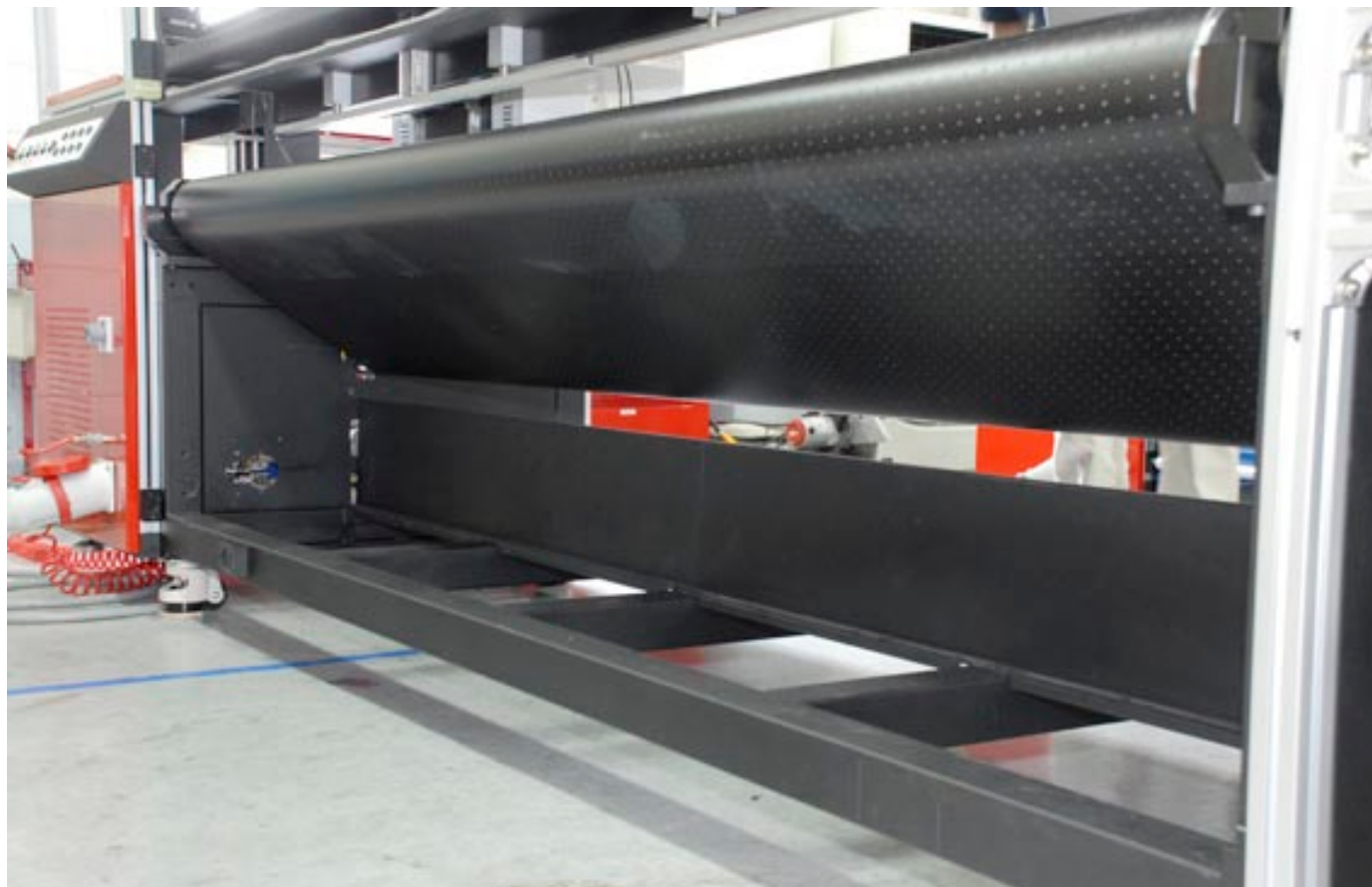
Transport belt

Plus, the IP&I transport belt is operated by four rollers; most transport belts are operated by only two rollers. I rate the IP&I transport belts as one of the best potential printer conveyor belts I have yet seen. I would never have noticed it's superior construction if it had not been possible to get down inside the printer at the manufacturing plant. Plus both IP&I management and Ronald Scheepers (the main distributor for The Netherlands) explained the evolution of this belt from earlier designs from Hypernics via the first generation IP&I printers. The Cube260 is an advanced generation printer.

24. Size, does it stick out?
The conveyor belt does not stick out like on the Dilli. The Zund 215 has the longest conveyor belt but that does not appear to help its quality, which is not superlative.

25. How well does this belt hold up to heavy use? Does it skew?
You can check this yourself to some degree by looking at the transport belt from either side. Have the lighting shine on the belt so that you can see the horizontal sections. What you want to see is whether the woven aspect of the belt remains straight, or whether it has shifted from stress and strain.

The belt in the Dilli Neo, and hence the belt in all Agfa :Anapurna L and XL models, are woven, and thus pulls out of parallel orientation. Whether this affects transport of rigid material is a question that only a long-time user can tell you.

The transport belt of the Chinese-made Creation UV combo printer brand is most politely described as cheap rudimentary and almost home-made.

The construction of the belt on the IP&I has neatly parallel rows of holes, with solid bands of material (with no holes) about every 10 inches. This arrangement appears much more stable than that of the Dilli or Agfa.
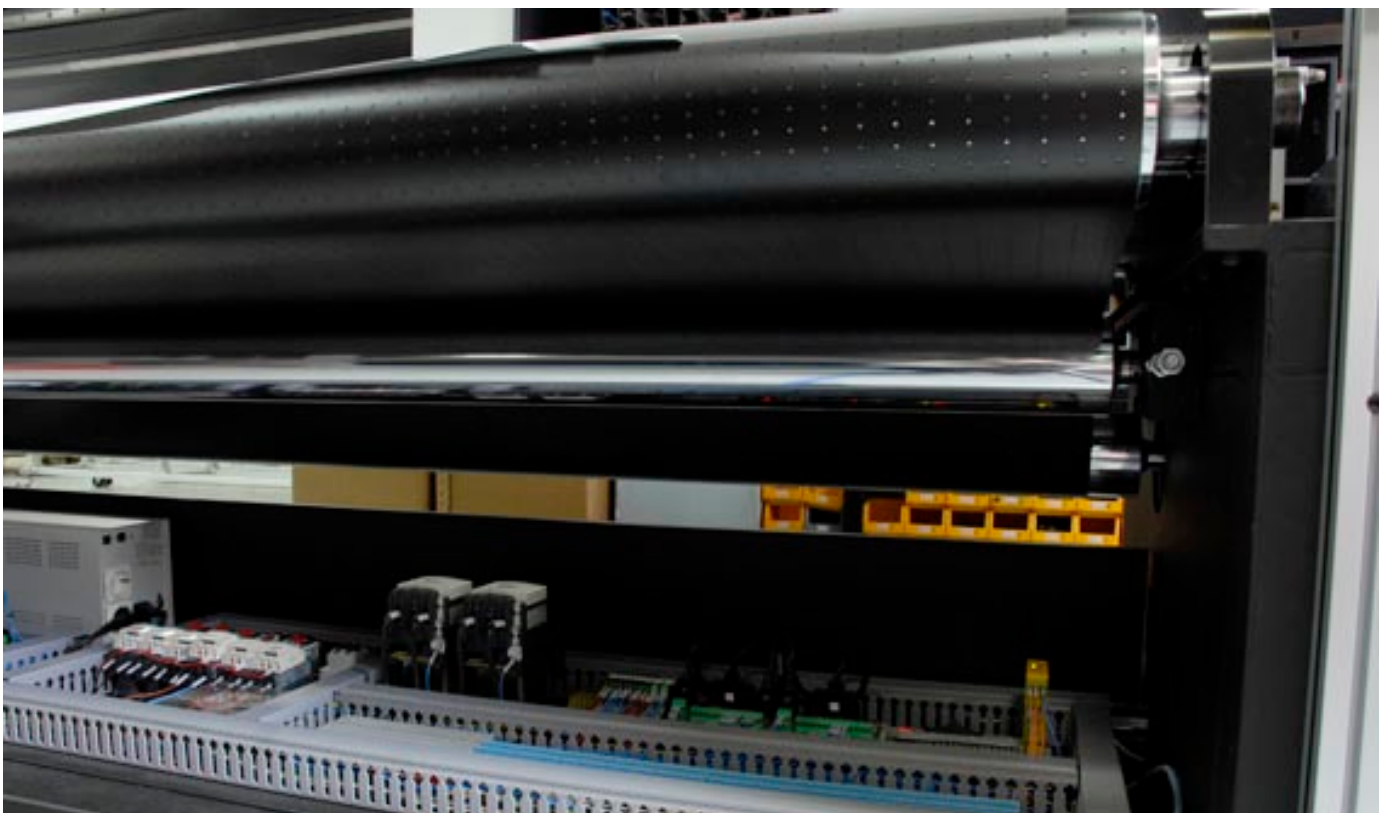
26. What does the transport belt area of the printer look like under the belt?

You should expect two drive rollers, one at the front the other at the back. In between is a rectangular vacuum bed, essentially the same kind of bed you get on a dedicated flatbed printer.

The IP&I Revo transport belt uses three rollers. The IP&I Cube260 uses four rollers and thus is one of the more sophisticated systems available. This is a quality you would expect in a quarter-million dollar printer (but is missing on most of them, and available already included with the IP&I Cube).

27. Which is the drive roller for the transport belt (where is the motor and what kind of motor turns the transport belt?

The Mitsubishi drive motor is at the left, on the end of the front roller (the drive roller for the transport belt). The construction is what you would expect of a Swiss-made printer.

Transport belt motor

LINING UP FLAT MATERIAL (to help it feed straight)

28. What kinds of raised guide bars along the side of the table exist? Left or right? How long?

Each edge of the table has a raised guide bar.

29. Is there a registration gate that is lowered across the back printing area?

There are two drop-down gates.
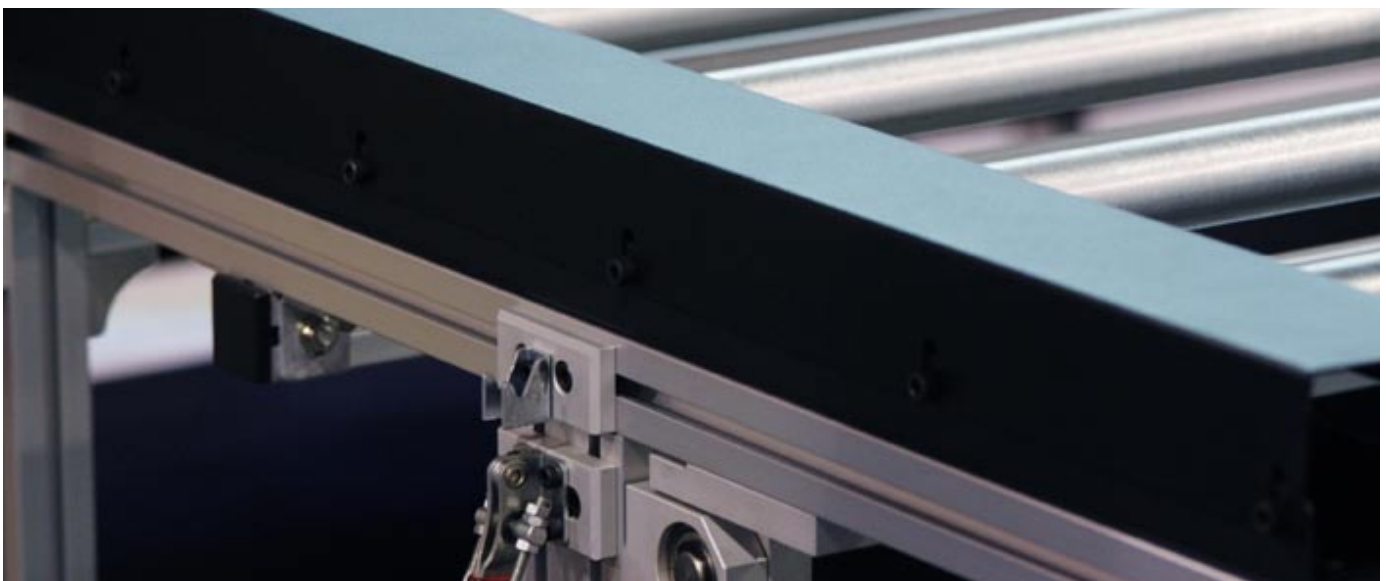
IP&I Cube260 at ISA 2007. You can find sturdy raised guide bars at the edges of the table.

FLATBED ASPECTS (for dedicated flatbeds)

30. How much weight can the table hold?
100 kg.

31. Is pin registration present? How many pins? What is their position(s)?
Rather than pin registration (that you get primarily on a dedicated flatbed) this model offers a registration gate that you lower by pressing a button.

ROLL-FED

32. How is media held flat? Vacuum table? Pinch rollers?
Both vacuum and also two long pinch rollers.

33. How is roll media fed? Pinch roller against grit roller?
There are no small pinch rollers or grit rollers because the material is moved by the transport belt. But there are two full-length metal pinch rollers.

34. Are the pinch rollers same size as grit rollers, or smaller?
The pinch rollers are about 2 inches in diameter. One is across the front; the other is across the back.

35. How are the pinch rollers raised (when you want to raise the entire row to get media underneath)?
The pinch rollers are raised with a motor.

36. Can you raise an individual pinch roller, on only the entire row?
Since each pinch roller is one solid unit, it rises and is lowered as one unit.

IP&I Cube260 at ISA 2007. A long pinch roller is placed across the front and another across the back of the printing area

37. Can the pinch of the pinch rollers be varied?

If you need a lighter "pinch" you can easily add any kind of a roller, suspended from the one provided by IP&I. A major producer of wallpaper uses his own roller concept. Or, if you wish, you can ask IP&I to custom-make a pinch system especially for your special applications.

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

A saddle is formed of two rolls with a slight space between them. You rest your roll of substrate on the saddle created by the two adjacent rolls. You don't need to run a spindle through the roll. You don't need to fumble loading the end of the spindle into two holders (one at each end). Loading a saddle is quicker as a result. But a saddle is primarily used on heavy-duty industrial printers 3.2 meters or wider where the weight of a roll may cause a spindle to sag. Plus, it's a headache to thread a spindle through a 5-meter long core.

The roll is held in a "saddle," this means there are two rollers that cradle the roll. This is quickest and easiest to load since you don't have to fumble with a spindle.

On the front saddle, one roller is of one material (gray); the other roller is smooth. At the back both rollers are of the matte gray material. You would have to look at a dozen different machines to know whether there is a reason for having one roller of smooth surface.

39. How is the roll media handled at feeding position? For example, is there a dancer bar?

There is no noticeable dancer bar front or back.

40. If a combo system, does the media feed directly onto the transport belt or is there an intermediate roller bar out in front?

Yes, there is a special roller bar out in front.

41. How much media is wasted during loading and feeding?

With some brands of printers you suspect that they are deliberately designed to waste ink and media since this is how those companies get their profits. Media is moved too far out, media is wasted before and after cutting, etc.

42. Can you print on more than one roll of substrate simultaneously?

Being able to print on several different rolls of material simultaneously is common on grand format solvent-based printers but almost unknown (and unavailable) on printers less than 104 inches.

43. For handling ink that passes through the weave of fabrics or mesh, is there a trough? Or other mechanism to catch the ink?

No, on all combo systems you have to place something over the belt if you print fabrics or mesh.

44. Is there a cutter? Is it manual or automatic.

Combo printers do not have cutters.

45. Is there a "knife guide," a slot where you can draw your knife down and across the width of the substrate?

Combo printers do not offer knife guide slots.

STRUCTURE: Miscellaneous

46. Does the printer have leveling supports? How many, and how strong?

Leveling any UV printer is crucial. Indeed at the NUR factory, once the structure is leveled in the assembly room, rather than roll it from stage to stage, all construction stages take place with the printer not moving from stall to stall.

In addition to the wheels on the main chassis, there are a total of four leveling supports out on the cabinet ends.

47. Does the printer have wheels? How many, and how strong?

There are four sturdy wheels, with protectors around them. These are robust; this is not low-bid junk.
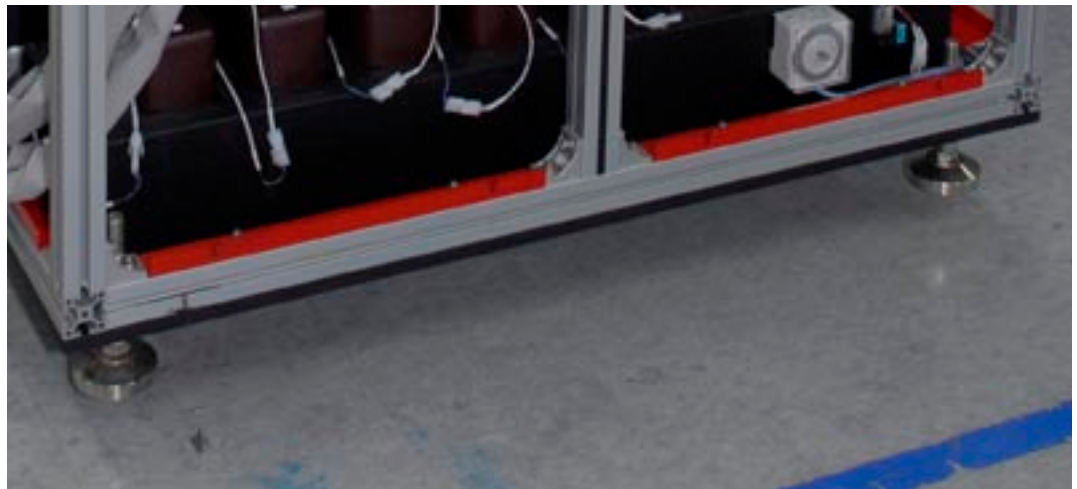
TABLES for Combo or Hybrid Flatbed

48. What is the design of the take-up table?
   • Horizontal roller bars the full width of the table?
   • Horizontal roller bars with rigid supports in the middle and/or elsewhere too?
   • Separate flat bars with rows of tiny rollers?
   • Solid flat table with small roller bars?
   • Solid flat table with ball bearings?
   • Another design?

The feeder-tables and take-up tables still consist of long parallel rollers. Each table consists of three joined sections.

Please note: some kinds of feeder take-up table (the table after the rigid material comes out of the printing area) may cause a warped piece of material to snag against the roller bar. So the design and implementation of the take-up table is something you need to understand. Both DuPont and Oce changed their roller-bar system for a solid table (DuPont added ball bearings).

49. If the table(s) are of roller bars, how are cross-supports situated? Same level as rollers? Or under the rollers?

The structure is under the rollers. There are 8 rollers per section.

Miscellaneous

50. What moves:
• the flatbed platform,
• the printhead area,
• only the material (fed by roller table; then gripped and fed by the printhead area mechanism as on a regular printer; or both?

For example, on the Inca Columbia the flatbed itself moves in and out for every line of print. The 3M (Leggett & Platt) machine is unique in that it has two options for movement, both the material and the head assembly in X, Y directions.

The material moves on the conveyor belt. The printheads move back and forth as on any traditional printer.

The flatbed table is not physically attached to the body of the printer. As you can see, the table consists of three sections of parallel rollers

51. If the objects you are printing are not as wide as the full width of the printer, does the printing carriage still have to cross the entire space, or can the printing assembly hover just over the area of what has to be printed (and thereby be a bit faster?).

Yes, most sophisticated printers can hover. But this may cause too much heat build up over one part of the printer. So your software also needs to be able to modify the hovering position if so desired.

OPERATING THE PRINTER

52. Is the printer user friendly?

Yes. The main user interface (on the touch screen monitor) has the13 sections. The advantage of having a large monitor is that everything can be displayed at once. You don't normally have to waste time digging down into some menu.

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

There are physical control buttons for some functions and a touch screen for all the rest. The control buttons include:

- E-reset
- Power
- Pause
- Vacuum
- Clean
- Pinch
- (interior) light
- Solution

54. Do you get an LCD screen in the printer or a real computer monitor? How big is the screen or monitor?

You get a real computer monitor that is plenty large enough. It would be sad to list the UV printers from other major brands, that cost more than the IP&I, but have smaller monitors.

55. Is the position of the LCD screen or monitor user-adaptable?

The monitor is set into the front panel, so it does not wobble.

56. How many operators or operator assistants does this printer require?

A single operator is all that is needed.

57. Where does the computer keyboard sit?

Instead of having to type everything via a keyboard, everything is via a convenient, well thought out touch-screen. The interface looks user-friendly.

You get a touch screen, where you can manage half of the operations (above) At right, in the operation area you can see the control buttons and the touch screen

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58. Where does the operator stand or sit?
Front right.

59. What aspects of the printer can you operate from behind (the loading area)?
There are purge buttons at the back. There is a row of five buttons:
- Start position
- Pinch (a delightful translation)
- Media CW
- Media CCW
- Take Up

And eight purge buttons.

These are the control buttons you find in the back left area. Basically you get an emergency stop button on every control area.

60. Is a foot pedal included (for operating aspects of the printer)?
I have not noticed a foot pedal.

61. Is there a pole with beacon lights?
Dilli was among the first to use a vertical pole with beacon lights. Most UV printers do not use such a tower of lights.

CONSTRUCTION (BUILD QUALITY)

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

The printer is well constructed. Two different print shops that had these IP&I printers did not complain. This is the best compliment a printer can have.

63. How would you describe the overall workmanship of visible parts? Clean (Swiss made), or flimsy and uneven (several Chinese-made printers)?

Looking inside (for example, inside to the left, with the service area to the right), the printer looks Swiss made: clean, precision-made, without a lot of junky odds and ends (minimalistic design, which is a positive compliment).

SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS

64. What are the electrical requirements of this printer? This means, will the building have to be rewired.

1 phase AC 220V, 50/60Hz, 50 amp, which is fairly basic, meaning that the entire building does not have to be rewired.

65. Do you need to budget installing a ventilation or room exhaust system?

All UV printers need room ventilation, for everything from ozone to misting ink to general odor.

IP&I is honest in recognizing the need to remove ozone by providing adequate ventilation. Too many printer manufacturers claim that no ventilation is needed.

66. Are there any special temperature or humidity requirements or preferences of this printing system?

The KonicaMinolta printheads are "extremely sensitive to temperature, humidity, and contaminants from exterior such as dust. The printer requires well-controlled environmental conditions in order to produce the high quality output constantly.

20 to 25 degrees C; less than 20 degrees C is bad for the printhead. And, within this approved range, it should not fluctuate. It should remain constant. Variation of temperature requires variation of compressed air pressure, which is delicate and complex.

Humidity must be between 40% and 60%.

Dust causes blockage of the printhead. Ink mist from airbrush printers and in general other solvent printers are also not ideal.

67. What is the connectivity? Network, SCSI, FireWire, or other?

Ethernet.

68. Does the printer come in one piece? Does this mean you have to remove a wall to get the printer this size into your office?
The printer comes in one piece, with the tables separate. Everyone is in one crate (two boxes inside one crate).

69. What is the size and weight of the printer?
The 2.6 meter printer is 4.35 meters wide (long) by 1.2 meters deep by 1.82 m high.

The 1.3 meter printer is 3.3 m wide by 1.176 m deep by 1.84 m high. But the 1.3 meter model is no longer made: the primary model is the CUBE 260 (and the CUBE 1606 series).

The model 260 weighs 1,800 kg.

INSTALLATION OF THE PRINTER

70. What is the rating of usefulness of the User's Manual and other associated materials?
The User's Manual is 91 pages.

71. What is the native language of these guides? Is the translation acceptable?
Native language of the guides is Korean. Translation is acceptable but occasionally literal or stilted. The same issue occurs with manuals of Japanese printers as well, such as Mimaki. The manual is, however, better than that of the leading UV printer manufacturer in China.

These printers have been wrapped for shipping at the manufacturing plant. The printers are delivered in one piece

TRAINING

72. Realistically, what expenses must you incur for the installation, such as a fork-lift truck or crane to lift the printer off the truck?
A fork-lift truck is required to have 3-5' fork due to the size of the printer.

TECH SUPPORT & WARRANTY

73. What is the original warranty period?
One year.

74. Does it include parts, labor, printheads?
It does include parts and labor. The spec sheet does not specify printheads.

CLEANING & MAINTENANCE NEEDS

75. Can you select which ink lines/printheads to purge, or can you only purge in clusters or all or nothing?
Yes, you can purge individual ink colors.

76. Where is the service area, at the left, or at the right?
Everything is at the right.

77. Where is the parking area, "home?"
The carriage parks itself at the right.

78. Is the service area the same as the parking area?
The left cabinet is only for the carriage to reach the end of its path and return the other direction. There are no service functions in the left end of the printer.

MAINTENANCE

79. What daily maintenance is required if you print the entire day long?
You need to oil the carriage rail every eight hours.

You need to clean the wiper (printhead nozzle wiper) after every eight hours.

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SAFETY & HEALTH CONCERNS

80. How many emergency stop buttons are there? Where are they located?
Four emergency buttons; two on the front; two on the back.

You can find a stop button on every corner of the printer

81. How much ozone is produced?
Yes, ozone is produced, and this is acknowledged clearly by IP&I in their manual.

82. Is the machine enclosed, or exposed?
Enclosed.

83. Does the hood close down completely to seal the system, or are there a few inches open at the bottom?
The hood on any hybrid or combo system must allow space for boards to pass through, so it's hood can never close down tightly onto the platen area. The design must allow space; this space is closed off with a skirt. Some printers use flaps or rubber like material; other printers use skirts of brush-like material.

84. 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?
One vent opening is provided. The printer has a single vent opening sticking at the top.

The only UV printer, so far, that takes ventilation seriously, is the DuPont Cromaprint 22UV.

85. How easy is it to obtain the MSDS of the ink?
Since the ink is from Sun, the MSDS is probably easier to obtain on the web site of Sun Chemical.

86. How do users know if they are allergic to the non-cured ink?

As with all chemicals, allergic reactions can take many forms. But people we have spoken with indicate that if you spill non-cured UV ink on your skin, if you are sensitive, you will notice it quickly (and painfully). But even if you do not react immediately, you do not want to have UV ink or the flush for UV printheads on your skin.

PRINTHEAD TECHNOLOGY

87. Which brand printhead is used?

This printer uses Konica-Minolta printheads. The brand and picoliter output of the head are clearly indicated, which is rare.

88. How many nozzles per printhead?

512 nozzles per head.

89. How many printheads per color?

One per color; two for white.

90. How many total number ofprintheads?

Eight heads.

PRINTHEAD DPI & Features

91. What is the drop size in picoliters?

Picoliter drop size is stated to be 14, which is quite small (hence the high quality of the output).

92. What is the advertised DPI, and is it true dpi or "apparent" dpi? How is dpi presented (with what adjectives)? How is this dpi calculated?

True dpi is 360; the dpi achieved by multiple passes is 360 x 1440.

93. How many passes can this printer achieve?

2, 4, 8, or 16.

94. Does the software use passes or modes to describe quality levels?

Increasingly most printer companies are not listing the passes that their printers run back and forth. The definition of a pass is not consistent in any event: FLAAR defines a single pass as the movement of the printer carriage, while jetting ink, from one side to the other. There is a difference between "single pass" and "one pass" but that needs an entire article (one pass means a page-width row of non-moving printheads).
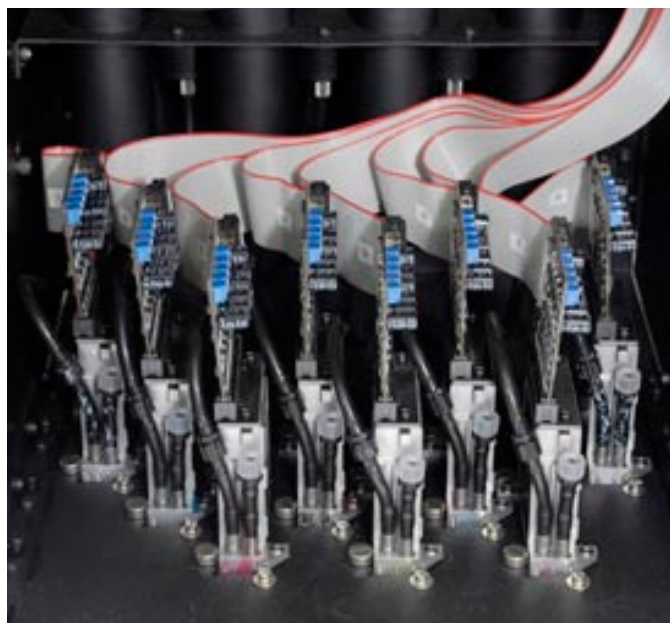
The 260 model has a total of 8 printheads: CMYK, lc (light cyan) lm (light magenta) and two whites

Mutoh describes one pass as a complete back-and-forth movement (FLAAR defines that as two passes).

Most printer manufacturers would rather avoid having to state clearly how many actual passes it takes to achieve specific quality levels. So they create "modes" that are a combination of passes and possibly other features that result in a specific quality level.

This IP&I gets good marks for clearly indicating how many passes it's printer uses.

PRINTHEAD Life Expectancy

95. What does each printhead cost to replace?
Estimated replacement cost for a printhead is $2,000.

SUBSTRATES

96. Can this printer handle printer rigid material only, or roll-to-roll only, or both interchangeably?
The printer can handle flat, rigid, and also roll-to-roll materials.

97. What sizes of material can be printed on?
Rigid or flat material can be 2.6 meters wide by whatever length you can handle. Roll-fed materials can be 2.6 m wide by whatever length your file can handle.

You can choose from 2 to 16 passes in the touch screen. As in every printer, you have to set your priorities between speed and quality: the slower you print (16 passes) the better the print quality, and viceversa.

98. Is roll-fed media loaded from the rear, top, or front?
Materials are loaded from the rear.

99. Can you adjust the rate of media feed?
Yes, indeed you need to adjust the rate of feed to remove banding lines caused by media feed that is slightly off. This is not the fault of the printer but a result of the fact that each different kind of material feeds slightly differently.

100. What thickness can this printer handle?
Up to 3.75 inches (9.5 cm). This is thicker than most printers, which is an advantage.

IP&I Cube 260UV. A door is being lined up to be printed. This model can print materials up to 3.75" (9cms) thick.

101. What materials does the manufacturer list?
- Paper
- Flex
- Banner
- Roll type sheet
- Glass
- Steel
- Carpet
- Acrylic
- Foamboard
- Wood
- Window blinds
- Fabric
- Tiles
- Marble

But, there is no mention of the problems with glass, acrylic, fabric, and tiles (and probably marble too). Fabrics can clog the printheads with their fibers. Smooth materials have adhesion issues if not pre-coated and then top-coated after printing.

Glass cabintet doors taken at a site-visit case study in Korea

Samples of doors printed on with a Cube260 model at ISA 07. Possibilities with this printer go beyond traditional media.

Wallpaper roll taken at a site-visit case study in Korea

SUBSTRATES, Issues

102. Can you print on mirrors?

Yes, not officially, but one of the printshops is producing beautiful images on mirror-like metallic surfaces. These are fully as reflective as a regular mirror.

103. What exotic or atypical materials can you print on?

Actually most of the IP&I UV printers are being used in niche markets, precisely because of their ability to print on a diverse range of materials:

- Steel
- Glass
- Leather (Nike)
- Wood
- Stone
- OLED backlit materials
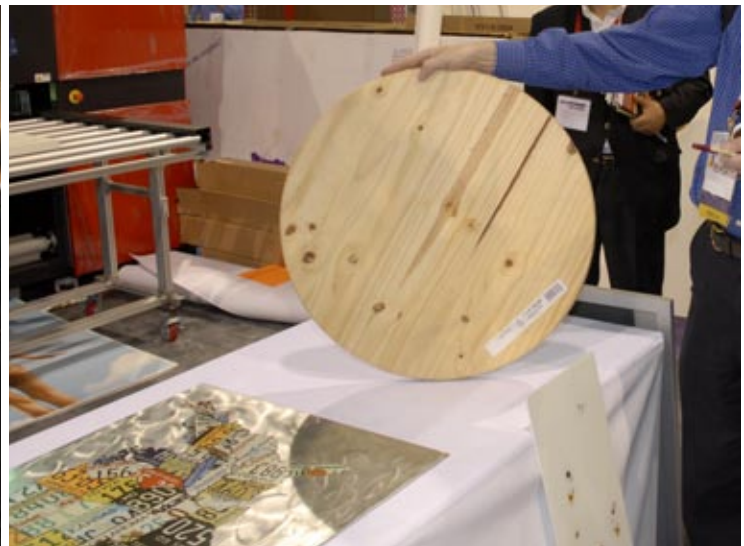
Applications have gone from traditional signage to decorative and architectural uses, considering that you can print on wood, glass, leather, wood, stone, glass, etc.

104. Heat concerns: will the heat generated by the UV curing lamps cause adverse effects to some delicate forms of heat-sensitive media? Which materials might curl, distort or discolor from the heat?

Heat sensitive materials would include polyethylene, polypropylene, shrink-wrap, very thin and thermal sensitive papers, plastic coated cartons, PVC and aluminum foil (www.dotprint.com/fgen/prod1297.htm).

Oce lists several other common signage materials as sensitive to the heat of UV lamps. For these reasons we have a separate FLAAR Report on applications and materials.

Heat can build up when the printhead carriage hovers over a small area to print a narrow job. Heat can build up inside the printer as materials (especially metal) absorb heat and hold it (and then radiate it out for a long time). So heat is not only an issue from the obvious and immediate heat of the UV lamps. Residual heat can be an issue as well.

105. What about build up of static electricity? What kind of materials cause this? Do some materials generate static electricity which cause the media to attract ink in areas not supposed to be printed on. How is it manifested?

You do need to be aware of how to prevent static electricity build up:
- No carpets or rugs on the floor. Indeed you should consider anti-static tiles or carpet.
- Use a humidifier during winter months to avoid dryness
- Learn which media are susceptible to gathering a static charge.
- Consider a printer that has specific anti-static features:
    - Grounding
    - Static bar(s).

Most printer reps suggest this is more an environmental issue than a printer or ink issue. They say you can't have carpet and you must maintain a high humidity. They admit that the static electricity situation varies depending on each site's situation.

To help in all of this, the IP&I Cube260 offers an optional full-width static ionizer bar system.

106. What happens in very dry weather (low humidity), especially in winter with central heating?

During dry periods (with low humidity) static problems may increase. With a high static charge (such as with PVC materials), the ink is attracted to charged areas of the material. This results in overspray (ink laydown in unintended areas).

SUBSTRATES: Cleaning, Priming, Preparation

107. Do you have to brush off or otherwise clean each sheet of incoming material by hand before you print on it?

Generally yes. The need to clean incoming materials is typical of any printer. Some materials have more detritus or dust or issues than other materials. And some suppliers offer better materials than others.

108. Which substrates ought to be laminated, top-coated, or otherwise post-treated?

Realize that top-coating (a UV clearcoat) may be useful on some materials and even possibly required on some applications. This may require an additional machine, space, training, and further ventilation considerations. You are not protecting against the sun, you are protecting against the ink rubbing off slippery surfaces such as glass or marble.

Lamination can also serve to provide a glossy finish on a material that is naturally matte.

SUBSTRATES: General Concerns

109. What problems in feeding exist, such as skew to one side?

Skew will be something you have to be careful about with any printer that is not a dedicated flatbed. A dedicated flatbed is a printer where the media does not move; instead the media stays fixed to a vacuum table and the printhead (or the entire table) moves. But not all dedicated flatbeds can accept roll-to-roll materials.

Skew results because no one single feeding system can accommodate all kinds of surface characteristics or thicknesses of materials.

So far the printer owners have not complained about skew with this printer. But you would need to interview printer operators in your area, and shops that print specifically the materials you wish to use, since some materials are more prone to skew then others (heavy materials for example).

APPLICATIONS

110. What are the applications listed by the manufacturer?

The supplementary product literature lists printing tiles for subways and bathrooms. However the adhesion issue is not addressed in the product literature. You have to roughen the surface of the tile to increase adhesion and then coat the tile's painted surface to protect it from abrasion.

Same with carpet: you need to find a kind of carpet that will receive the ink and not lose it in the pile. Plus the fuzz on the carpet will tend to get into the printheads, causing clogging. But if you find UV-printable carpet material, and keep your printing environment cleaned, then you can produce attractive carpets.

The supplementary brochure also shows examples of printing on stone, for wall design and general architectural decoration.

In the brochure's discussion of printing on fabrics, they list printing on material used for soundproofing.

Printing on doors is a valid application. Just realize that the door may need to be painted white first (since using the white UV ink is expensive). If you don't paint the door white then the natural wood grain will show through the image (which may be a desired effect, but not usually).

111. Can you print on textiles or fabrics? How do you handle the ink that gets through the weave?

In order to achieve a stronger image on fabrics or mesh, you can print two (or more) strikes.

INK

112. Is an extrudable or thermal-formable ink available from the printer manufacturer?

At present only Mimaki and Gandinnovations offer a special heat-formable UV-cured ink. At present only Hexion and Gandinnovations offer a special heat-formable UV-cured ink. The Mimaki heat-formed samples are simply a basic generic flexible UV ink that they can stretch a bit; as of summer 2008 Mimaki was not yet using a real dedicated thermo-formable ink.

113. How many colors are used to produce output - four, six, or eight?
The configuration is dual CMYK or six colors plus white ink.

114. Other than white, how many spot colors are available? What about metallic colors?
It is not usual to offer spot colors.

115. What is shelf life of the ink (CMYK)? Does the white ink have a shorter shelf life?
Expiration date is 6~9months for White, 9~12months for normal colors from date of manufacture.

Wallpaper sample

116.What company makes the inks? Choices include DuPont, Jetrion (now InkWare/VUTEk), Hexion, Sericol, Sun, Triangle, KonicaMinolta, Toyo, Tetenal and several others.
Sun Chemical provides the ink. Whereas some companies develop their own UV ink (NUR, VUTEk) or have substantial ink chemistry development departments (HP Scitex, Gandinnovations, etc), UV ink can be rather complex so most printer manufacturers prefer to concentrate on making good printers and leave it to the giant chemical companies to produce a better ink.

117. Where are the printer's ink containers located? Front, back, or sides?
All eight ink containers are in a single row at the left side, lower compartment; this opens from the left end.

INK: White & Varnish

118. Is white ink available?
Yes, dual white is offered because you need double the amount of white in order to have it opaque enough to work.

119. What is the sequence of printing the white ink? Can you print all white and then print colors on top?
The white ink printheads are staggered: one is at the front, the other is at the back. This allows printing white "leading" and "trailing" simultaneously.

120. Is the white ink opaque enough?
Yes. And you can vary the white ink density from normal and 100%.

121. Does the white ink need special attention? (Titanium dioxide may settle out if it sits too long). What company provides the white ink?
Yes, the white ink does need special attention. IP&I provides a timer and stirring system. You can see this in front of the white ink container.

122. Is the white ink situated in the same area as the other inks?
Yes, all ink bottles are in a single row.

123. Is spot varnish available?
Spot varnish does not really work well. The owner of a Durst Rho 600 said his varnish was not realistic.

124. Is an extrudable ink available?
No special heat-formable ink is offered at present.

INK Cost

125. What is the cost per container? What is this cost translated to liters?
Ink cost varies depending on country and distributor but is substantially less than the ink for the Gerber Solara (which is about the most expensive UV ink in the world).

126. How much ink is used to print a square unit?
IP&I provides charts that show precise ink costs per square meter.

All ink containters are located at the left side, placed in one single row

FLAAR Reports

127. How much of this is ink, and how much is flush?
Much of the waste is flush solution.

128. How do you know when the waste container is full?
The interface monitor alerts you when the waste container should be emptied.

129. How often do the ink filters have to be checked? Cleaned? Changed?
The ink filter should be changed every 3 months. Another section says every 6 months.

INK: General Knowledge

130. Describe the ink supply system (to the printhead)?
A compressed air system controls the ink supply to the print head.

131. Is there an issue with "ink starvation?"
"Ink starvation" means that not enough ink can get to the printheads in fast printing modes. Ink starvation is a real issue that affects even some quarter-million dollar printers. So you need to check with end-users to see if they have issues with ink starvation.

So far not reports of ink starvation on the IP&I Cube260uv printer.

132. Can the end-user vary the printhead temperature, or is the temperature fixed?
Temperature can be varied, individually by printhead.

FLAAR Reports

INK: Longevity

133. What is the longevity outdoors? What about in the full sun in direct sunlight?

Estimated ink longevity outdoors is 2 to 3 years. In real life the longevity depends as much on the substance as on the ink. A few substances such as Lexan and Coroplast may not hold up very long under certain environmental conditions.

134. What about solvents such as cleaning solvents? Do they mar, dull, or wash away the ink or change the surface quality, especially on vehicle wrap?

- Ammonia (in Windex and comparable cleaning liquids)
- Acetone
- Cleaning alcohol
- Gasoline
- Soap and water with sponge
- Soap and water with a broom (frequently used to clean vehicle wraps in Latin America, for example)
- Scotch-tape pull-off test

INK Color Gamut

135. Is the color gamut what your clients need for their logos and products? How about red? Does it turn out more orange? Is red bright enough in saturation to satisfy clients? Or are the colors overall a bit dull?

Like all UV-cured ink, greens are a bit yellow, but on this printer, just barely. At the recent Sign Spain show (2006), the red was a bit pink (as is typical of UV-cured ink in general).

The colors are overall within the range of colors that UV chemistry can provide (reds that are pink or magenta, for example). Most printer manufacturers use Sun ink, so the same color issues are found on most UV inks.
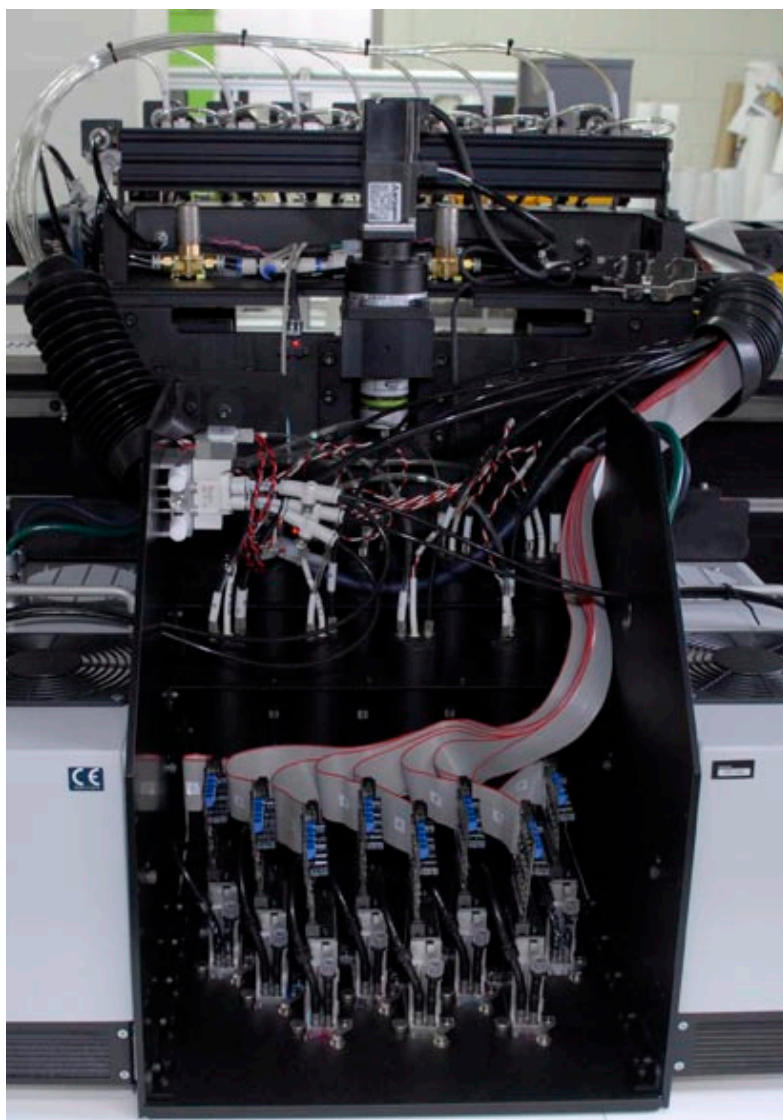
A compressed air system carries ink to the printheads. Temperature can be varied individually for each printhead

THE UV CURING LAMPS

136. What technology is used in curing lamps: microwave, continuous (mercury arc), LED, or flash (pulsed Xenon)?

Mercury arc.

137. What wave length do the lamps cover?

320~450 nm.

138. What brand of lamp is used?

The original was an H-type bulb, from Integration Technology. This bulb was selected as being best to handle white ink. By autumn 2006 the lamps were model VZero 2 140 NT with shutter from Integration Technology.

139. How many lamps does the printer use?

Two.

140. How long does the lamp last, in terms of hours of operation? How many hours are used up by each "strike" (by each time you turn the lamps on)?

'3 months after Installation' are guaranteed.

141. Is the lamp fan filter a user-replaceable item? How often should this be cleaned or replaced?

If the filter gets clogged with dust then it is less efficient in keeping down heat. Heat build-up is not good for the overall carriage area.

142. What is the true drying (curing) time of the inks used with this set of lamps? What factors influence the true (total) drying time?

The ink does not necessarily totally cure within seconds. Some colors, depending on how thick the ink is laid down, may cure "instantly." But several factors may result in a cure that takes 24 hours, 48 hours, or weeks. If you set the print mode for "glossy" this reduces the lamp intensity. These prints will outgas for weeks.

UV curing lamps from Integration Technology are placed at the sides of the printhead carriage

UV LAMPS: Cooling

143. Are there shutters?
No shutters (at least none on the model shown at ISA '06 in the Spring), as is typical on most printers costing under $180,000. Shutters are an advantage, so not having them is a slight deficiency. Most entry level printers have no shutters.

Shutters help control light leak and save from having to turn the lamps off. So the lamps last a bit longer and you can be more productive, not having to wait for the lamps to cool down and then warm up all over again.

The newer models IP&I printers have shutters on their UV lamps.

144. How are the lamps cooled? Air? Fans? Water-cooled?
The lamps are cooled in the normal way with air from small fans.

145. How many settings do the lamps have? Or are the fans just Off and On?
Two settings only: High and Low; and Off.

RIP SOFTWARE & Printer Software

146. Does the price of the printer include a RIP?
In the beginning a RIP software from KoreaSoft was used. Wasatch was then offered as a bundled RIP. At the Sign Spain trade show (Madrid, 2006), the local distributor offered Caldera RIP.

Most features, such as how many RIPs are available, have improved considerably since 2006. For example, now (since autumn 2007) you can also obtain Caldera as a bundled RIP worldwide, as well as Onyx.

COLOR MANAGEMENT FEATURES

147. What color management sensors or measuring tools are on-board?
It would not be expected that most printers have any of their own color management tools. The ColorSpan is the only UV-cured ink flatbed printer that we know of that offers color management features actually built inside the printer.

PRODUCTIVITY & ROI (Return on Investment)

148.How much time does it take to set-up each new size and shape of rigid printing substrate?
This aspect is not listed in any spec sheet. You learn this only if you spend an entire day in the demo room, but doing the loading and printhead height calibration yourself. Then you get a further comparable reality check when you start production in your own print shop.

This factor will make or break your production goals. It makes little difference how fast a printer will print if you have to spend 7 frenzied minutes to align and set-up each new print job by hand.

So find one of these printers that is already installed, and learn from them what productivity obstacles exist and what real throughput is.

ADVERTISING CLAIMS

149. How does the actual printer compare with what was claimed in the ads?

The printer advertisement features the high quality; the output shown in the booth substantiates the high quality that the machine is capable of.

I would also give good marks to IP&I for working out, and publishing, the true cost of printing.

150. Do certain parts of the printer need to be repaired or accessed so often that you have to remove safety plates or protective plates to make access easier?

This is mainly with Chinese-made printers.

151. How often do people return this printer and say they want their money back?

This is mainly with Chinese-made printers.
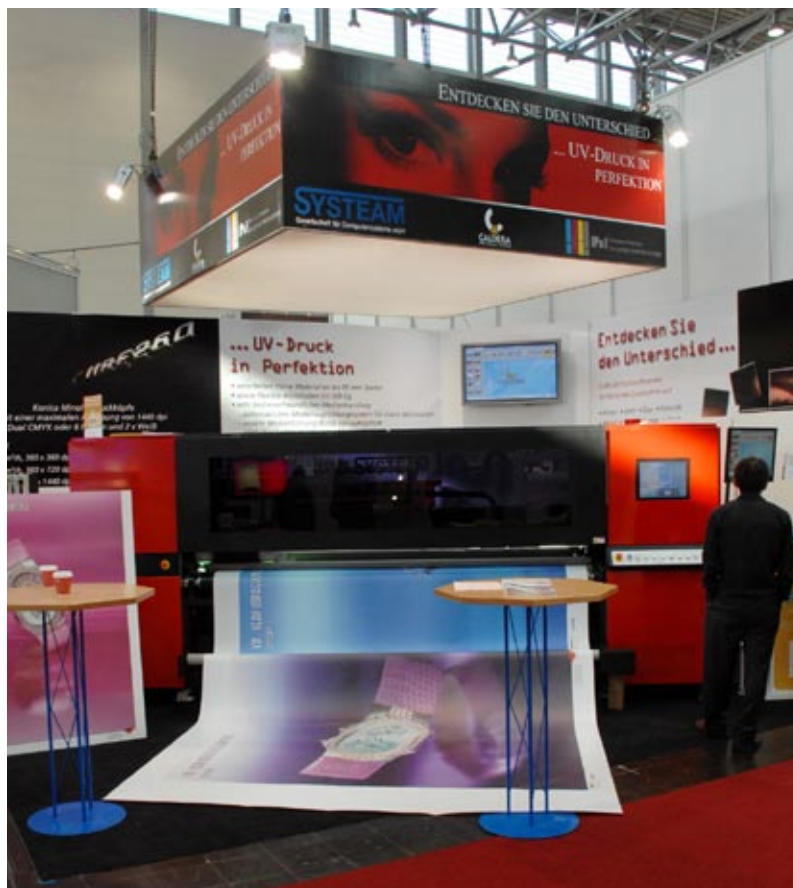
GENERAL CONSIDERATIONS

152. How many printers of this model are in use; in the USA; in the rest of the world?

A sign on the display model at ISA 2006 indicated that it had been sold to a company in California. Subsequently a Cube260 was sold to Washington D.C.

At Sign Spain (Madrid, October 2006) IP&I had two confirmed sales and was hoping for a total of 5 sales. That is relatively good for a brand that is new.

At FESPA '07 IP&I said they had sold 13 machines in Korea. The overall count was 48 UV printers worldwide, including inventory held by distributors. Sales are best in Italy (Montplast is the Italian dealer), France, and Spain (Sirod is the Spanish dealer).

By autumn 2008 they had sold 15 printers in Korea in that year alone (so about 30 in Korea over two years). They had orders for six more after that in 2008.

In comparison, it is estimated that they outsold all other competitors in the Korean market.

Overall (worldwide), IP&I will have sold well over 150 printers by autumn 2008 and we estimate could reach almost 200 (total since launch) by the end of 2008. We estimate this is both models, the 1.6 meter and the 2.6 meter models together.

FLAAR Reports

Print examples at FESPA Mexico 08

153. What will the resale value of your printer be in three to five years?
The two main brands of Korean printers, Dilli and IP&I, should enjoy reasonable resale value over the next 10 years. DYSS would tend to have resale value among screenprinting shops that know the brand name DYSS (which is less known in the digital signshop markets).

COMPARISONS WITH OTHER PRINTERS

154. When people are considering buying this printer, what other printer(s) are they also looking at?
- ColorSpan, various models.
- Dilli, usually rebranded as Agfa
- GCC, though these are not widely available as Agfa or ColorSpan.
- Oce 250.

Occasionally other printers.

155. What features on the other printers may be issues?
Xaar heads in the GCC StellarJet 250 is a factor; most experienced end-users prefer a higher print quality. The KonicaMinolta head in the Cube260 is a significantly better quality, especially for text down to 4 pt size.

The Oce 250 offers only four colors. That means transitions will be dotty (grainy; you can see the individual dots of ink in the scene).

The Oce 250 is slow, and does not have any options for white ink, though that has now changed with the launch of the Oce 350 at SGIA 2008.

The IP&I Cube 260 does well on glass and is equally beautifully on roll-fed wallpaper.

156. What aspects of the selected printer help decide in its favor?
Build quality, six colors, white ink capability, and ability to take roll-fed or rigid materials are the selling points of the IP&I Cube260.

Plus the IP&I is sturdy. This printer is well-made inside out, as was clear from inspecting it in detail at the factory and also at two printshops.

SUMMARY: Image Quality Issues: Banding

157. How much banding is reported with this particular printhead?
Slight banding in solid black area. It is a challenge to print solid black without banding on most printers. So far the best anti-banding results I have seen anywhere is on the Durst Rho 700.

SUMMARY: Image Quality Issues: General

158. Is text sharp or fuzzy? What is the smallest text that you can easily read?
Text is exceptionally fine with the IP&I Cube UV printers. The text quality compares favorably to the Durst Rho 600, which is the best text quality of the quarter-million dollar printers. Other printers with excellent quality are those of Mimaki, which use ToshibaTec heads and uni-directional mode to achieve their quality. 6 pt reverse text is well rendered.

But as of October 2006 the quality for small text has advanced considerably. IP&I and the others mentioned above held the prize during early 2006, but today Vutek, Oce and Gandinnovations can also both render small fonts.

159. Do you need "Pantone markers" to do touch-ups?
If you use Pantone markers or other markers for touch-ups you run the risk that these areas will fade faster than the original UV ink.

CONCLUSIONS:

Conclusions
Reality Check

Observations about printers made in China are taken exclusively from dealers and distributors who have worked with Chinese UV printers for a long time. These are not opinions of FLAAR, these are statements from industry.

When a Chinese printer from Flora comes into an American or European dealers they all report that they unbolt many of the parts and throw away these cheap parts and replace them with more solid parts. That's right, they junk a major part of the Chinese construction before they even turn the printer on for it's first week of demo printing.

Same with Infiniti: two distributors in Europe have stated they have to replace some of the parts before they even deliver these printers to clients.

In the US these parts are not replaced, and the two Infiniti UV printers were rated by the two sign shops that bought them as unsatisfactory due to constant breakdown and due to parts constantly wearing out or falling off. We visited one of these sign shops four times and the other twice, so we have plenty of documentation.

Other Chinese brands are improving, but until we visit sign shops that have purchased these other Chinese brands, we have no way to comment on which of the over 14 Chinese brands of UV-curable printers have reached an acceptable stage. Visiting sign shops is costly (time involved, airfare, etc). Preparing a FLAAR Report costs about $4500. That is not including any of the cost of dissemination, just the research and preparation as a PDF. Visiting trade shows alone costs almost $40,000 a year. But as funds become available, we definitely work at expanding coverage.

Chinese brands such as "Design" show definite promise.

Note that these comments are for Chinese UV printers. Chinese solvent printers are totally different (they are better). The same printshop that had a UV printer that constantly fell apart, they have about 3 Challenger printers and 4 Infiniti solvent printers and are content with all seven.

The difference is because you can't get away with using cheap plastic ink tubes for UV ink (due to the heat inside). You can't simply copy the superficial design based on snapshots taken at a trade show (this is how features are copied). You need engineers and chemists and people that understand UV ink and curing, and understand movement of a diverse range of materials of all kinds of sizes, weights, and shapes.

This is why it was so essential to visit printshops that owned IP&I printers. Both shops were productive, and profitable. One shop had two IP&I printers; the other had three. This is the best testimonial you can ask for.

You quickly notice that this printer is designed, engineered, and manufactured in South Korea. The difference when you compare this machine with printers made in other countries is substantial. The printer is an equally professional level of craftsmanship. The print quality is excellent. Even the brochures are as sophisticated as you would expect from a printer manufactured in Switzerland, Austria, Germany, or the US. Indeed the brochure is a fully professional level of graphic design.

Pros

Optional full-width static ionizer bar system.

Designed and manufactured by professionals

I rate the IP&I transport belts as one of the best potential printer conveyor belts I have yet seen. The solid material out of which they are constructed has advantages over the woven structure of transport belts on competing brands.

A major advantage of a manufacturer in Korea, is that they don't run low bid sweat shops. Their factory does not accept low bid junk for parts. Majority of parts are made in Korea or imported from US, Japan, and Europe. So there is less chance of cheap junk low-bid nuts, bolts, and screws from causing the imported parts to fall off the printer.

Made in Korea by a company that is 100% dedicated to UV printing. This is not a company that lives off solvent printers and only retrofits them into UV. IP&I is primarily devoted to UV-curable inkjet technology.

The User's Manual has several tips that are unique, and demonstrate the professionalism and experience of IP&I in digital printing.

The User's Manual is honest and states clearly that ventilation is needed. This honesty is typical of Asian manufacturers. Too many other companies try to claim that ventilation is not necessary, attempting to distinguish UV ink from solvent ink.

The IP&I literature offers detailed figures on ink cost per square meter plus the cost of other consumables, such as the printhead and UV-lamps.

The IP&I Cube printer offers an option to print the ink at the same spot to make the image more clear on rough media (double-strike). This could also be considered as a way to print Braille-like raised images.

I have visited two successful printshops that were using the IP&I. One had bought a second model Cube260. If this printer was no good, it is unlikely they would have nought it.

The other printshop had two IP&I Revo models (the predecessor model). Then now had one IP&I Cube 260. This suggests they are content with IP&I quality and tech support.

During the visit to the factory, a major European distributor was also in the factory for two days. They signed up to distribute the IP&I in Europe.

During the same visit another European distributor, who was already a dealer for IP&I, was receiving training. He was fully content with these printers and with the company that stands behind them.

Downsides

In terms of construction quality, this printer is far ahead of many competitors. Frankly I have a challenge to find features that are bad. I will want to visit other end-users, but one thing I notice, how a printer reacts depends greatly on how well the end-user is trained, and how and whether the operator keeps the printer cleaned.

Most UV-cured ink is weak in some reds, and too strong in magenta and pink. This is a generic issue with UV-cured ink chemistry, and is not the specific fault of IP&I.

Comments & Suggestions

When it first appeared in the USA (ISA spring 2006), the Cube260 UV offered the best quality for text of any printer under $200,000. In terms of quality for small text, the only wide-format printer that I have noticed is comparable is the Durst Rho 600.

All the other printers which offer a special ability to render small text with crispness are not wide-format sizes. All the narrow table-top Mimaki UV printers are specifically made to produce high quality for close viewing, but none of them offer a width of 2.6 meters, not even the new model, which is only for sheets 1.3 by 2.6 meters. The Cube260 can do 2.6 meters by as long as can be fed. The Aellora SureFire is also not a wide format and in any event, does not take roll-fed materials. Besides, that printer company went out of business.

But by Sign Spain (Madrid, mid-October 2006), the Vutek QS2000 offered fine text; Gandinnovations developed a way to get dramatically improved text at small sizes. And the beta-stage Oce 250 offered crisp text down to 4 pt type.

The only way to document a printer is good enough to recommend is to have many end-users report that they like the printer. So far we have two such instances with the Cube 260uv.

We cannot yet say the same for the Eastech or its OEM versions (Fuzion) or for the Dilli and its OEM rebadged versions by Agfa and Mutoh. There are not enough end-users who we know or have access to. Indeed we had lunch with one owner who had distinct problems with his Dilli printer (in Spain). He did, though, feel it was his specific printer that was off; not the entire model or technology. Indeed be traded that machine in for a new Dilli, and no longer has problems. But the next time we meet an owner of a Dilli we will learn more.

The same is the situation for the IP&I Cube series. I wish to add to the two site-visits that I have undertaken. It costs between $3,000 and $5,000 to do such a study: time, airfare, hotel, local transportation to the shop, then writing up the notes into a report, graphic designer to put the text into a legible PDF format, etc. So we have a set charge of $4500 to initiate a site-visit; that's the break-even cost. Our university does not cover any of the costs involved to go out and undertake this research.

Spending three days with IP&I in Korea was a productive time. I would liken this printer to being a hidden jewel. The construction quality inside and out looks like it is made in Switzerland. Yet not many people talk about this model because the manufacturer's brand name is not yet known. This is in part because the predecessor company, Hypernics, never exhibited in the US or Germany and because this is the first printer of the successor company IP&I. The Cube 1606 is their second model (entry-level to mid-range).

During autumn 2008 it was possible to gather additional information on IP&I, both on the company and on their printers. Because IP&I did not exhibit at SGIA 2008, it was essential to understand the status of the company. It turns out that because the US economy is slowing, that several foreign manufactures decided not to exhibit at SGIA.

FLAAR intends to continue studying these IP&I printers. Our interest is to find ideal printers for museum displays and outdoor signage for archaeological parks. I am also interested in trying the white ink options for layering techniques with backlit displays.

If you need more information about IP&I, please contact:
David Yoon
davidyoon@ip-i.co.kr

Most recently updated October 2008 before SGIA.

First posted April 2006. Updated October 2006 and November 2007.

Update Policy

Starting in 2008, updates on UV-curable wide-format inkjet printers are available for all individuals and companies which have a subscription, or to companies who are research project sponsors. To obtain the next update write ReaderService@FLAAR.org.

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.

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

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

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

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

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

XY Cutter Options

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

To contact Gerber:
Phone (US): 800-222-7446, email: cservice@gspinc.com
Fax: 800-227-6228 or 860-648-8064
Phone (Intl): 860-648-8028, email: gspinternational@gspinc.com

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

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

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

Gerber M Series cutter at ISA '08.

Enjoy visiting other
FLAAR network web sites

Water-based Inkjet: photo, indoor signage, advertising, proofing, CAD, GIS, , including textile printers
www.wide-format-printers.org

Printing Fine Art Giclee
www.fineartgicleeprinters.org

Printing for outdoor use: UV-cured, solvent, eco-solvent, etc.
www.large-format-printers.org

Scanning
www.flatbed-scanner-review.org

Digital Photography
www.digital-photography.org

Reality Check

Being a university professor for many years does not mean we know everything. But intellectual curiosity often leads us to enter areas that are new to us. So we do not shirk from entering areas where we are obviously not yet expert. If in your years of wide format printing experience have encountered results different that ours, please let us know at ReaderService@FLAAR.org. We do not mind eating crow, though so far it is primarily a different philosophy we practice, because since we are not dependent on sales commissions we can openly list the glitches and defects of those printers that have an occasional problem.

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

Licensing Information

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

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

Update Policy

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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.

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Please Note

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

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

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

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

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

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

Citing and Crediting

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

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

The material in this report is not only copyright, it is also based on years of research. Therefore if you cite or quote a pertinent section, please provide a proper credit, which would be minimally "Nicholas

Hellmuth, year, www.FLAAR.org." If the quote is more than a few words then academic tradition would expect that a footnote or entry in your bibliography would reference the complete title. Publisher would be www.FLAAR.org.

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

Legal notice

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

Advisory

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

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

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

Or the product may indeed have a glitch but one that is so benign for us, or maybe we have long ago gotten used to it and have a 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, often turns out to be a need of more operator experience and training. More often than not, after learning more about the product it becomes possible to produce what it was intended to produce. For this reason it is

crucial for the FLAAR team and their university colleagues to interact with the manufacturer's training center and technicians, so we know more about a hardware or software. Our evaluations go through a process of acquiring documentation from a wide range of resources and these naturally include the manufacturer itself. Obviously we take their viewpoints with a grain of salt but often we learn tips that are worthy of being passed along.

FLAAR has no way of testing 400+ specifications of any printer, much less the over 101 different UV printers from more than 46 manufacturers. Same with hundreds of solvent printers and dozens of water-based printers. We observe as best we can, but we cannot take each printer apart to inspect each feature. And for UV printers, these are too expensive to move into our own facilities for long-range testing, so we do as best as is possible under the circumstances. And when a deficiency does become apparent, usually from word-of-mouth or from an end-user, it may take time to get this written up and issued in a new release.

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

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

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

But even when we like a product and recommend it, we still can't guarantee or certify any make or model nor its profitability in use because we don't know the conditions under which a printer system might be utilized in someone else's facility. For ink and media, especially after-market third-party ink and media, it is essential that you test it first, under your conditions. We have no way to assure that any ink or media will be acceptable for your specific needs in your specific print shop. As a result, products are described "as is" and

without warranties as to performance or merchantability, or of fitness for a particular purpose. Any such statements in our reports or on our web sites or in discussions do not constitute warranties and shall not be relied on by the buyer in deciding whether to purchase and/or use products we discuss because of the diversity of conditions, materials and/or equipment under which these products may be used. Thus please recognize that no warranty of fitness or profitability for a particular purpose is offered.

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent, eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Our reports are on usability, not on health hazards.

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

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

Results you see at trade shows may not be realistic

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

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

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

Trade show examples tend to be on the absolutely best media. When you attempt to save money and use economy media you will quickly notice that you do not get anywhere near the same results as you saw in the manufacturer's trade show booth, or pictured in their

glossy advertisement. Five years ago we noticed Epson was laminating prints to show glossy output because their pigmented inks could not print on actual glossy media. The same equipment, inks, media, and software may not work as well in your facility as we, or you, see it at a trade show. All the more reason to test before you buy; and keep testing before you make your final payment. Your ultimate protection is to use a gold American Express credit card so you can have leverage when you ask for your money back if the product fails.

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

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

Factors influencing output

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

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

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

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

Be aware that some RIPs can only accept ICC color profiles: you quickly find out the hard way that you can't tweak these profiles nor generate new ones. So be sure to get a RIP which can handle all

aspects of color management. Many RIPs come in different levels. You may buy one level and be disappointed that the RIP won't do everything. That's because those features you may be lacking are available only in the next level higher of that RIP, often at considerable extra cost. Same thing in the progression of Chevy through Pontiac to Cadillac, or the new Suburbans. A Chevy Suburban simply does not have all the bells and whistles of the Cadillac Escalade version of this SUV.

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

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

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

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

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

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

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

The major causes of printer breakdown and failure is lack of maintenance, poor maintenance, spotty maintenance, or trying to jerry-rig some part of the printer. The equally common cause of printer

breakdown is improper use, generally due from lack of training or experience. Another factor is whether you utilize your printer all day every day. Most solvent and UV printers work best if used frequently. If you are not going to use your printer for two or three days, you have to put flush into the system and prepare it for hibernation (even if for only four or five days). Then you have to flush the ink system all over again.

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

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

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

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

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

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

Realize that a FLAAR Report on a printer is not by itself a recommendation of that printer. In your local temperature, in your local humidity, with the dust that is in your local air, with your local operator, and with disorientation of the insides of a printer during rough shipment and installation, we have no knowledge of what conditions you will face in your own printshop. We tend to inspect a printer first in the manufacturing plant demo room: no disjointed parts from any shipment since this printer has not been lifed by cranes and run over a rough pot-holed highway or kept in smeltering 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 book of sales in the third quarter of 2008 resulted in many tech support problems.

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

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

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

Counterfeit parts are a problem with many printers made in China

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

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

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

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

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

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

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

Be sure to check all FLAAR resources

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

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

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

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

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

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

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

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

We thank MacDermid ColorSpan (now part of HP), Hewlett-Packard, Parrot Digigraphic, Color DNA, Canon, Gandinnovations, and other companies for providing funding for technology training for the FLAAR staff and our colleagues at Bowling Green State University in past years and for funds to allow us to attend all major international trade shows, which are ideal locations for us to gather information. We thank Sun LLC, Caldera, EskoArtwork, Raster Printers (EFI Rastek), DEC LexJet, DigiFab, Barbieri electronic, Seiko II, Mutoh Europe, IP&I, Dilli, Yuhan-Kimberly, GCC, Grapo, Durst, and WP Digital for providing funds so that we can make more of our publications free to end-users. During 2000-2001 we had grants to cover all the costs of our publications, and all FLAAR Reports were free in those early years. As that early grant naturally expired after a few years, we had to begin charging for some of our reports to cover costs. Now (in 2009), we are seeking corporate sponsorship so we can gradually make another 20% of our publications free to our readers.

Since 2006 we do a major part of our evaluations at a factory and headquarters demo room. Since the university does not fund any of these trips, it is traditional for the manufacturer to fund a research sponsorship. In the US this is how most university projects are initiated for decades now, and it is increasing. In fact there is a university in Austria that is not an "edu" but is a "GmbH", funded by the chamber of commerce of that part of Austria. In other words, a university as an educational institution, but functioning in the real world as an actual business. This is a sensible model, 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, EskoArtwork, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Dilli, 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. Bordeaux, InkWin and Sunflower ink have brought us to inspect their ink manufacturing facilities and demo rooms. We have visited the world headquarters and demo rooms of HP in Barcelona and received informative and helpful technology briefings roughly 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 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 Hewoltt-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 improve-

ment 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 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.

An evaluation is a professional service, and at FLAAR is based on more than 11 years of experience. An evaluation of a printer, an ink, a software, laminator, cutter or whatever part of the digital printing workflow is intended to provide feedback to all sides. The manufacturers appreciate learning from FLAAR what features of their printers need improvement. In probably half the manufacturers FLAAR has dealt with, people inside the company did not, themselves, want to tell their boss that their pet printer was a dog. So printer, software, and component manufacturers have learned that investing in a FLAAR evaluation of their product provides them with useful return on investment. Of course if a printer manufacturer wants only a slick Success Story, or what we call a "suck up review" that simply panders to the manufacturer, obviously FLAAR is not a good place to dare to ask for such a review. In several instances it was FLAAR Reports that allowed a company to either improve their printer, or drop it and start from scratch and design a new and better one.

And naturally end-users like the opportunity to learn about various printers from a single source that covers the entire range from UV through latex through all flavors of solvent.

We have also learned that distributors often prefer to accept for distribution a printer or other product on which a FLAAR Report already exists.

We turn down offers of funding every year. These offers come from PO Box enterprises or products with no clearly visible point of manufacture. Usually the company making the offer presumes they can buy advertising space just by paying money. But that is not what our readers want, so we politely do not accept such offers of money.

Contributions, grants, sponsorships, and funding for surveys, studies and research is, however, open to a company who has an accepted standing in the industry. It is helpful if the company has a visible presence at leading trade shows and can provide references from both end users and from within the industry. Where possible we prefer to visit the company in person or at least check them out at a trade show. Obviously the product needs to have a proven track record too. Competing companies are equally encouraged to support the FLAAR system. We feel that readers deserve to have access to competing information. Competition is the cornerstone of American individualism and technological advancement.

FLAAR also covers its costs of maintaining the immense system of 8 web sites in three languages and its facilities in part by serving as a consultant such as assisting inkjet manufacturers learn more about the pros and cons of their own printers as well as how to improve their next generation of printers. It is especially useful to all concerned when manufacturers learn of trends (what applications are popular and for what reasons). For example, manufacturers need to know whether to continue designing software for Mac users, or concentrate software for PC users. So the survey form that you fill out is helpful to gather statistics. You benefit from this in two ways: first, you get the FLAAR reports in exchange for your survey form. Second, your comments bring (hopefully) change and improvement in the next generation of printers. When we do survey statistics, then the names, addresses, and telephone numbers are removed completely. A survey wants only aggregate numbers, not individuals. However, if you ask about a specific brand of printer, and do not opt out, we forward your request to a pertinent sponsor so you can obtain follow-up from that brand, since we ourselves do not have enough personnel to respond to each reader by telephone. But we do not provide your personal information to outsiders and our survey form has an opt out check-off box which we honor.

FLAAR also serves as consultants to Fortune 500 companies as well as smaller companies and individuals who seek help on which printers to consider when they need digital imaging hardware and software.
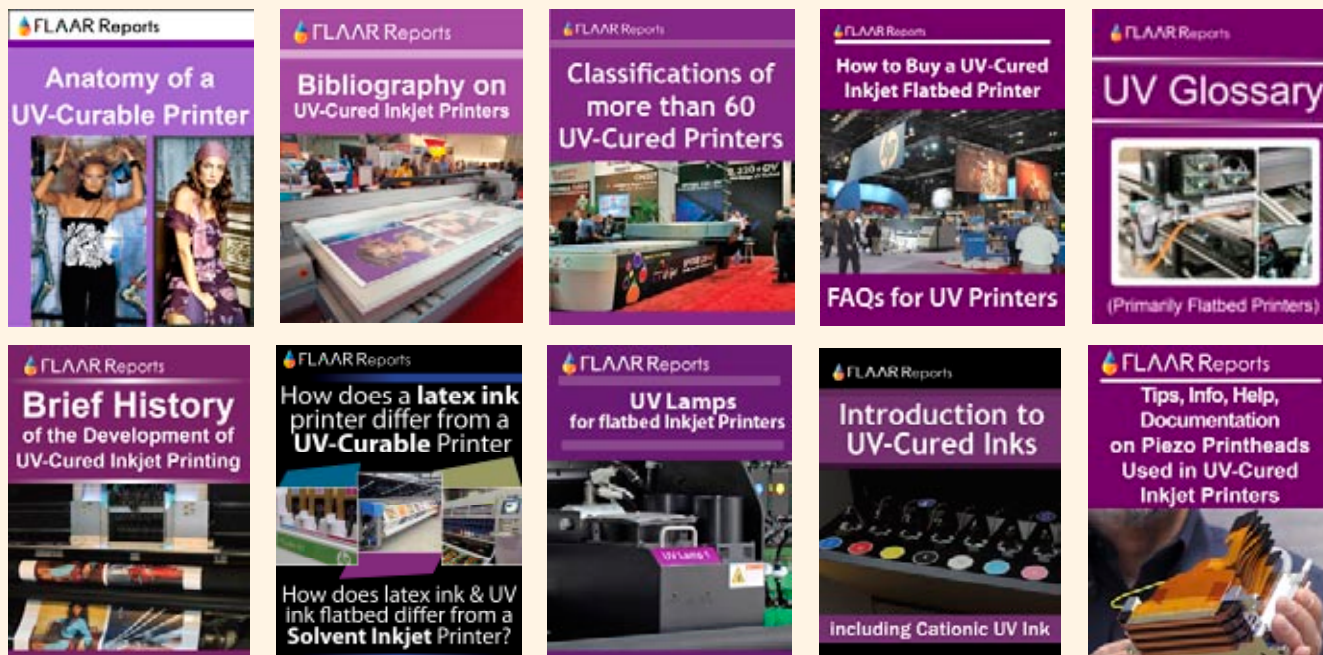
A modest portion of our income comes from our readers who purchase the FLAAR series. All income helps continue our tradition of independent evaluations and reviews of inkjet printers, RIPs, media, and inks.

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