FLAAR Reports

Entry-Level Dedicated Flatbed UV-Curable Printer

EFI Rastek T660

Nicholas Hellmuth

PLEASE NOTE

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INTRODUCTION

During August 2008 it was possible to spend a day at the factory where the EFI Rastek T660 is manufactured. So the earlier edition FLAAR Report is being updated based on the information gathered during this factory visit.

The ISI factory is outside Huntsville, Alabama. This is the NASA, aerospace and military-industrial complex area of the south. In other words, high-tech.

The EFI Rastek T660 is designed for printshops
   • which do not have the floor space for a larger flatbed printer.
   • who realize that they really need a true flatbed and not a combo or hybrid.
   • for printshops whose budgets simply won't allow a larger more expensive UV printer to begin with (though once they start with this T660 model, they may buy a larger unit when they have more experience gained by using the EFI Rastek T660).

For the Daytona H700UV it has been possible to visit a FastSigns printshop that has this nice combo model in active use for many months. So for that H700UV combo model I can say more since FLAAR has undertaken a site-visit case study. My schedule has been so full visiting UV printer factories, R&D departments and printshops that have other brands and models that I have not yet landed in a city with an H600UV. But as soon as I can evaluate a 600UV flatbed in-situ, it will be possible to issue an updated evaluation on how this printer functions in the real world. In the meantime I have gathered together a comprehensive report on what I have seen of this printer at over six trade shows over two years in many countries around the world.

Nicholas Hellmuth evaluates the Raster Printers Daytona H700UV at FastSigns facilities. There is a FLAAR Report on this model.

THE BASICS

1. Brand name, model?
Raster Printers Daytona T600UV, when the company was acquired by EFI Rastek this printer changed its name to EFI Rastek T660

2. What is the nature of the manufacturer? Is this company the manufacturer, distributor, or rebranding a machine made by someone else?
Raster Printers is, in effect, the distributor, but could also be considered the manufacturer in the sense that it's their own printer. But the actual manufacturer is ISI in Alabama. ISI is owned by the same company, Sakata INX, that owns Triangle. ISI has designed and manufactured solvent inkjet printers in the past, though I believe this is their first UV printer. However the owner of Raster Printers, Rak Kumar, has experience working at Oce for many years, including with their early UV printers.

ISI is also currently manufacturing a clever upgrade kit to turn NUR BlueBoad HiQ solvent printers into an ISIJet BlueStreak roll-to-roll UV printer.

3. What other printers are the same or similar chassis from this manufacturer or distributor?
There is no other earlier comparable printer from this manufacturer.

4. What other printers of other brands are comparable?
The only other printer that comes even close to this would be the small version of the recent Mimaki JF-series flatbeds, the JF-1610. But the Daytona flatbed is less complex (which has its benefits, especially in a slightly lower price).

5. How does this model compare with comparable previous printers?
There is currently no other UV printer with MEMS printheads besides the $350,000 L&P Virtu HD8. But at SGIA '08 and ISA '09 you will see at least one more printer with these heads.

6. When and where was this model first introduced?
This printer was introduced to the world at ISA SignExpo in Las Vegas, April 2007.

7. Is this printer mature or still in alpha-stage or beta-stage?
This is a good question; it could be considered between alpha-stage and early beta-stage in 2007 and in production stage by Spring 2008. When I visited the ISI factory in August 2008 the printer was long past beta stage and is being delivered to dozens of people on the waiting list.

EFI Rastek T660 had its first appearance at ISA 07.

8. List price?

By August 2008 the price is $85,000. This includes:

- PC (Some customers run both printer and RIP with the same PC)
- RIP (Full version of PosterShop to support white ink applications)
- Inks, ½ liter containers.
- Starter kit

But the price ranges from $75,000 to $85,000 depending on the printhead configuration.

9. 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 not needed, but if you want one, you are told where to buy it. A UPS would be especially good for the pump. The air vacuum system comes with the printer, but not the UPS.

With any brand, it is always advisable for you to find out what does the advertised price does or does not include.

10. 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 air pump is included. The vacuum needed is already built in the printer.

11. Is it recommended, or required, to buy a spare parts kit? Or extra printheads?

 Yes, there is a spare parts kit available as an optional purchase.

Most end-users don't wish to buy a spare parts kit up front, in part because they don't yet have the experience to do their own repairs when they are first buying this printer. Also, this printer is unlikely to need spare parts the first six months to a year or more if it is properly maintained. So generally it is the dealer or distributor that obtains the spare parts so that they are readily available to end-users.

12. Or do the dealers prefer that customers not try to make their own repairs?

Every printer manufacturer and distributor has their own policy on whether they wish the end-users to make their own repairs. The philosophy of ColorSpan was to keep the end-user from fiddling with anything inside the printer. This was logical because many were first-time users of this kind of printer. The downside was that once you became experienced, or if your printshop was already advanced, the lack of access to the innards of the printer was self-defeating and undesired.

But there is no right or wrong policy; ColorSpan is not "wrong," they are simply trying to protect newbie's from making a mess of the inside of the printer. In general, the end-user is usually not encouraged to take the printer apart and do repairs on their own. Only later on, when you have considerable experience, and have taken advanced tech support training, would doing your own repairs be realistic. However I have visited many printshops where the printer operator prefers to receive this training precisely so they can do their own repairs. After all, if the manufacturer can train their own tech support person surely a printer operator, who also works with this printer every day all month all year, can also learn how to maintain and repair it (if they have the interest and inclination).

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. Some manufacturers discourage this, but some manufacturers do allow end-users to take advanced service training.

Raster Printers encourages people to learn how to understand the workings of their printer mechanics because this may lead them to take better care of the printer.

13. What is the cost of a spare parts kit?

A spare parts kit costs $8000 and includes an extra printhead (alone worth several thousand dollars), two extra UV bulbs, and other spare parts that you may need during the first two or three years of use.

PURCHASING

14. 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?

You can buy direct from Raster Printers or buy from dealers in the US (such as Global Imaging); or from dealers in various foreign countries. In Brazil the dealer is the Marabu Ink distributor (but the printer uses ink from Triangle).

15. What kinds of leasing or other financing are available?

GE Capital plus all the normal avenues of financing.

FEATURES OF THE PRINTER: Vacuum

16. Is there a vacuum function?

Yes, vacuum is required to hold down materials, especially if the material already is a bit warped or if heat makes the material curl or bubble up.

17. Is the vacuum created by simple fans, or by an air pump?

Since this is not a low-bid printer, it uses an air pump.

18. If pumps, how many pumps are there?

Since the table size is modest you only really need one pump. But if you prefer a second pump, this is available as an add-on option.

19. In how many sections?

The table is not large enough to need more than one section.

20. Are the vacuum areas (size and position) user definable?

No, the only vacuum system that offers user definable areas that I am familiar with is Oce.

21. Can you turn one or the other section(s) off and on?

If you wish to have part of the vacuum table "off" you just cover it with a leftover sheet of material. Or make a template.

22. Just Off and On? Or variable?

Just Off or On. Not user variable.

Flat materials are held by the vacuum created by a pump located below the flatbed table.

STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path

23. 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 dedicated flatbed with no roll-fed accessory.

24. 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?
This is not a retrofitted solvent printer; this is made from the ground up as a UV-cured system.

The EFI Rastek T660 was designed to be a UV flatbed from the beginning. The size makes it a printer for a specific market. The other UV flatbeds of similar size are the Gerber Ion^x and the Inca Spyder 150.

25. Are there edge guards elsewhere besides on the table? At left, or at right, or both?
Edge guards are primarily for roll-fed media and primarily on hybrid style designs with a flat platen. So you don't expect edge guards on a dedicated flatbed printer.

26. How is media held flat? Vacuum table? Pinch rollers?
There are no pinch rollers on this table (yes, some dedicated flatbed printers actually do have pinch rollers; a flatbed UV printer from Sky Air-Ship even has two sets of pinch rollers).

27. Is there a registration gate that is lowered across the back printing area?
There is no gate on most dedicated flatbed printers.

28. Is two-sided printing realistic? Is there a special mechanism for registering the position of the image on the second side?
No special alignment features to facilitate registering two-sided printing.

29. Do you have to hand measure the media height, to enter it manually into the software?
There is a nut driver and shim to measure media height.

30. Do you have to measure the media size (width and length) manually and then enter it yourself into the software?
Yes.

FLATBED ASPECTS (for dedicated flatbeds)

31. If a dedicated flatbed, how many sections is the flatbed divided into?
The underneath structure of the vacuum table is in two parts, joined with interlocking sections.

32. If a dedicated flatbed, do the edges (joins) of the sections of the table cause a noticeable imprint on thin material?
Although the vacuum table itself is in two sections, the joined area (and the entire table) is covered with a black material that is one piece. So there are no edge joints detectable on the final top of the table on which the material rests.

33. Is there a pinch roller system, and if so, where is this located?
Yes, there are actually dedicated flatbed systems that also have pinch rollers. Indeed one Chinese flatbed has two sets of pinch rollers atop the flatbed. Of course this begs the question of whether its vacuum system is so weak that it needs the pinch rollers. I do not know of any high-end dedicated flatbed system made in North America, Europe, or Japan that has pinch rollers. While on this subject, there are also pinch rollers on a few combo-style printers, including at least one Durst Rho.

This is a one-section vacuum. Considering the size of the table and the inteded market you wouldn´t need sections in this printer. On wider dedicated flatbeds that have one vacuum section, the operator faces the time-consuming task of masking the area around the media to concentrate vacuum strength. Of course this slows down your production time.

34. If the table moves, what controls it's movement? Lead screw? How many (one on each side, or one in the middle, or three?).
There are two slender lead screws, one on each side of the table. But these move the gantry, not the table. The table is stationary.
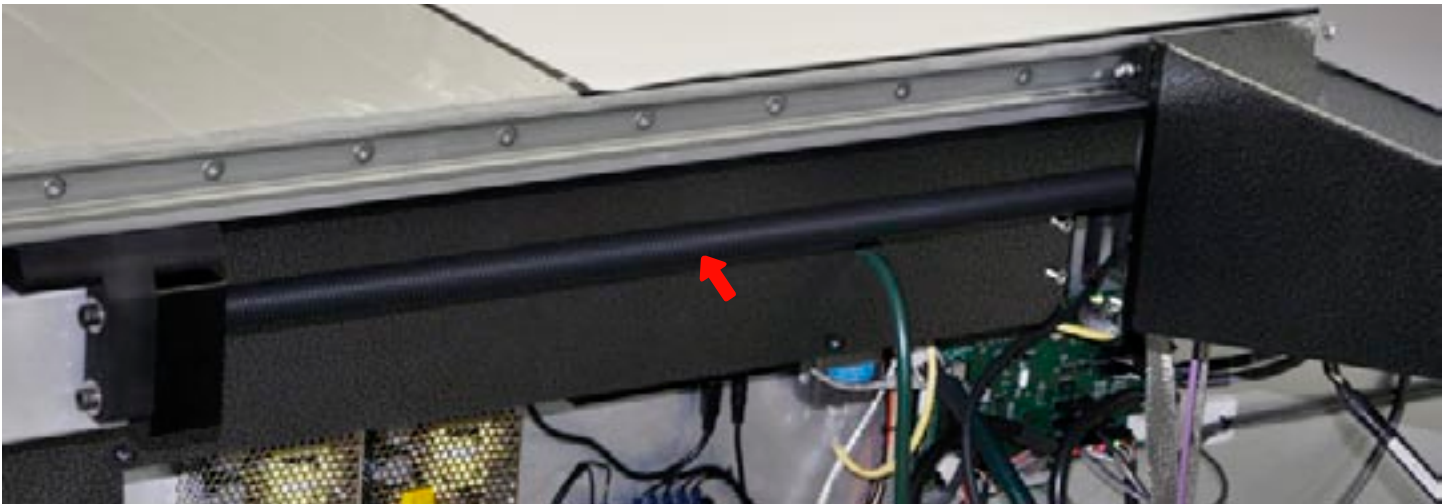
This is one of the lead screws that guide the movement of the flatbed.

35. Is pin registration present? How many pins? What is their position(s)?
Since the table is not huge, and in order to keep the price to entry-level, there are no pins for registration.

36. If no pin registration system is present, what kind of other registration system is available?
None.

37. Does the printhead carriage move across the widest dimension of the table (like Gandy Jeti or Oce 250), or across the narrow dimension (this is how Inca does it)?
The printheads traverse the long-dimension, which is the most efficient.

The longer Mimaki JF-1631 traverses the short dimension (not as efficient), but the shorter Mimaki, JF-1610, traverses the long dimension (more efficient).

38. What are the pros and cons of a dedicated flatbed compared with a combo printer (with moving transport belt) or hybrid printer (with platen)?
Even dedicated printers have their downsides too; with a dedicated flatbed you (the operator) are idle, totally, while the printer is printing. You can't load or unload anything. But if you have a top-of-the-line combo printer, such as the Durst Rho 800, you can load at the back while the printer is cranking the previous job of flat material out the front: this can print and load and unload all at the same time. I have seen this ability to feed-while-printing also with the ColorSpan 9840uv (HP Scitex FB910).
But with a dedicated flatbed printer, there is no alignment issue just because the media is not cut squarely from the factory. Poorly cut material is a major disadvantage for combo or hybrid printers. So again, the reason there are more than four different classifications of UV printers (hybrid, combo, dedicated flatbed, dedicated R-t-R) is because each has pros and cons.

In theory, the perfect printer would be a dedicated flatbed with a dedicated roll-fed system across the long axis (Gerber unfortunately is trying this across the short axis). Oce has not yet gotten their roll-fed device to function to the satisfaction of picky printshop owners (based on a quote from someone who owns two of the Oce flatbeds but who bought a $400,000 combo printer so he could handle all media types on a single platform).

STRUCTURE: Miscellaneous

39. Does the printer have leveling supports? How many, and how strong?
The leveling supports and wheels are on the same structure. The leveling supports go straight down; the wheels stick out a bit from the same bolt assemblage that goes up into the horizontal bracket at each corner. This works because the printer does not weigh tons and is of relatively portable size.

40. Does the printer have wheels? How many, and how strong?
There are four wheels. Since the printer is not intended to be unnecessarily heavy, the wheels are acceptable. But don't try to roll this printer up and down stairs or across rough concrete outside in a parking lot.

Wheels and leveling supports. At the right, you can see the bolt to fasten the structure of wheel and leveling support to the printer.

UPGRADES, Future Improvements?

41. What features have been added, or changed since the printer first appeared?
The lead screws were upgraded from regular (which had to be manually lubricated) to specially Teflon coated lead screws.

The wiring was made more efficient, in the sense of less complex wiring.

42. What features are being added, or changed, further out in time?
White ink was scheduled for July 2007.

43. Are upgrades modular, or are you stuck buying a completely separate new printer?
At present the upgrades will be added to your present printer. So you do not have to buy a completely different machine, just pay for whatever new options you may desire.

44. What firmware upgrades have been made available?
"Lots of firmware upgrades since the prototype was shown over 18 months ago."

45. What new firmware upgrades are likely in the future?
Grayscale capability for the MEMS printheads will be available "in the future."

Miscellaneous

46. 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?**

The flatbed table is totally fixed in position, and does not move. The gantry moves by increments. The printhead carriage moves back and forth within the gantry.

47. 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?).

This is a decision the operator has to make.

This is a stationery flatbed table design. The bridge raises over two supports at the sides of the fixed table. These supports move the bridge along the fixed table.

OPERATING THE PRINTER

48. What is the level of ease of use? Can anyone use this printer or do they have to be trained and certified? What about daily and periodical routine maintenance?
Stated to be easy. The only way to tell is to try it out myself, since my patience level is about zero. If I can learn to use it, anyone can.

49. Is the printer user friendly?
Stated to be user friendly. An entry-level printer has to be.

50. In the main area for operation, is the machine software based (touch screen), or with physical control buttons? Or both?
Software based (which is the modern way); no toggle switches, no buttons. You get toggles and buttons on many cheap Chinese-made printers.

51. Do you get an LCD screen in the printer or a real computer monitor? How big is the screen or monitor?
The printer itself has no LCD screen; you get a 15" monitor with the RIP station.

52. How many operators or operator assistants does this printer require?
You only need one operator, and only one person to load and unload. On some larger flatbed printers you really ought to have a second person to load large flexible sheets which bend too much if a single person tries to lift and carry them.

53. Where does the operator stand or sit?
You can operate the printer from any area, since it's all controlled from the monitor that you have with your RIP server.

54. What controls are on either end?
Other than an emergency stop button, there are no controls at either end.

55. Is a foot pedal included (for operating aspects of the printer)?
Yes, there is one foot pedal for turning the vacuum on and off to load and unload materials.
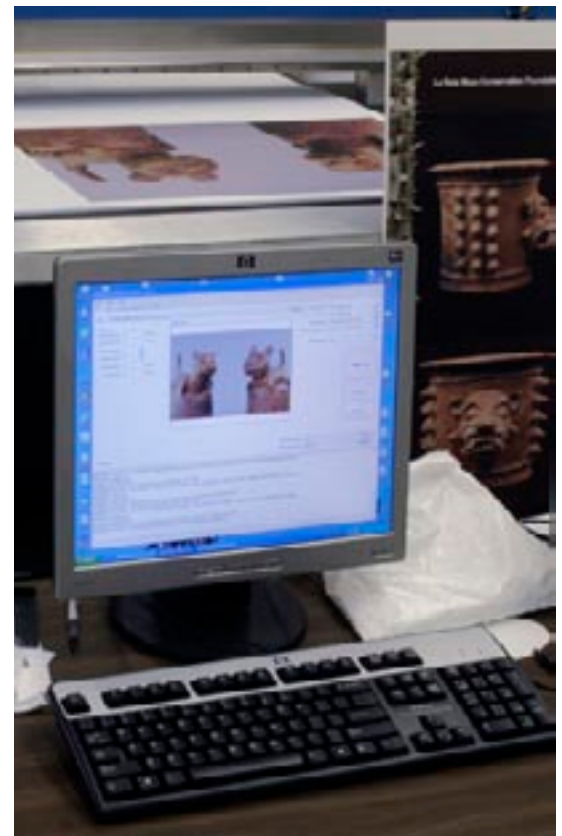
The printer comes with a computer to run the RIP. You can place this setup anywhere.

CONSTRUCTION (BUILD QUALITY)

56. Is there both a front hood and a back hood?
 There is no hood at all since the printing system is exposed.

57. How would you describe the overall workmanship of visible parts? Clean (Swiss made), or flimsy and uneven (several Chinese-made printers)?
The printer is made in the US and appears to be professionally designed and appropriately built.

58. Does the printer wobble back and forth when printing?
No wobble.

59. What sensors does the printer have?
Several sensors including a media sensor to prevent a head crash, ink level sensors, etc.

AESTHETICS

60. How would you describe the design of the printer?
Good basic design.

61. Can you easily tell which is the "front" and which is the "back"?
Until you get used to the printer, in part because it's small, and has no control monitor anywhere (you use your own RIP station as a monitor, and that you can put anywhere), it's not easy to tell which is the front or back. This is, however, not a defect, because you will learn what features are where during installation and training.

I call the front the area where the LCD and operator panel(s) are situated. This usually means that the other side is where you feed the material in. I call that the back. But many printer companies call the feeding area the front. It makes no difference as long as you define what you mean in advance.

Some UV-curable printers have a moveable control computer that can be situated at one end, or at the feeding area (whichever location the operator prefers). But the standard arrangement is that the LCD and keyboard are on the output side. I call this the front.
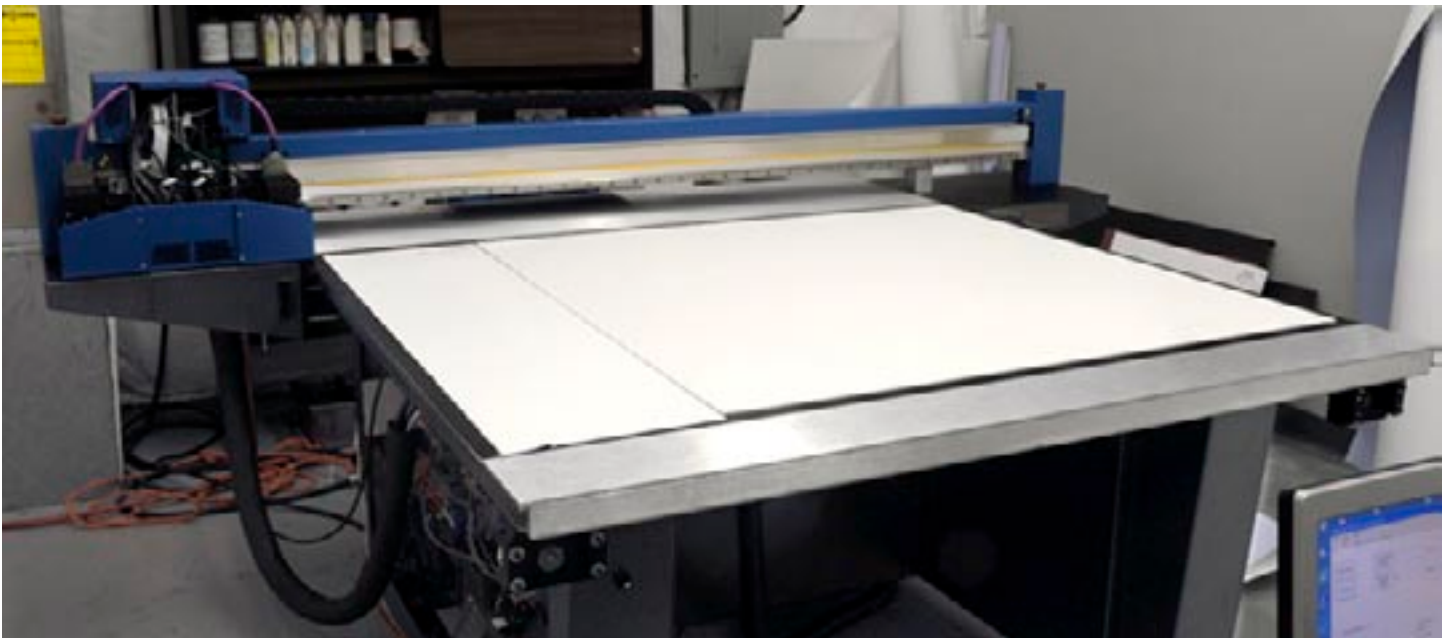
In exposed printers-as opposed to the enclosed machines-it is always more difficult to tell which is the front and which is the back. Such is the case of the Oce Arizona 250GT, the Gandinnovations 3150, the Teckwin TeckStorm, the Gerber ion^x, etc.

SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS

62. What is the delivery time, between the time I order the printer and it is delivered?
Delivery time varies depending on whether you order before, or after, a trade show. Normal delivery time for most UV printers varies between three to seven weeks.

63. What are the electrical requirements of this printer? This means, will the building have to be rewired.
200-204 VAC, single phase, 50/60 Hz, 30 Amps maximum.

64. Do you need to budget installing a ventilation or room exhaust system?
Yes, we advise having ventilation and a room exhaust system and a room area air cleanser (such as from Island Clean Air).

All UV printers need room ventilation, for everything from ozone to misting ink to general odor. Increasingly ozone production is surprised; this has led some companies to claim that "no ventilation is needed." Such a claim is dangerous, especially in a country like the US where litigation is so common. Has Agfa never heard of misted ink? Ink mist is what the printer operator could potentially breathe if the ink is misting (many printers mist, most notoriously the Infiniti 1600 models; the ColorSpan 72uvX also mists a great deal).

65. What is the connectivity? Network, SCSI, FireWire, or other?
USB 2.

66. What air pressure is required to be provided to the printer? Is this for a vacuum table, or other purposes (such as ventilation)?
No outside air pressure is required because the printer already takes care of this itself.

INSTALLATION OF THE PRINTER

67. Realistically, how much surrounding and support space will the equipment need in addition to the machine's own footprint.
Yes, you need a forklift truck with an 8-foot fork.

68. What is the size and weight of the printer?
The printer is 48 inches high, 77 inches deep, and 103 inches wide, weighing 900 lbs.

69. How many boxes arrive?
One.

70. Is installation included in the purchase price?
Installation is included in the full list price of $85,000 but not in the discounted price.

71. How many people come for the installation?
You need a total of three people, the printer installer and two of your own people.

72. Do people also come for a pre-installation site inspection? Or is the inspection just a form sent in by e-mail or fax by the print shop to the distributor? From the factory or from the distributor or from the dealer?
The site preparation pre-installation inspection is done via question-and-answer format that you report back to the manufacturer or dealer. This saves the cost of having a person come out to do an actual inspection.

FLAAR got to inspect the assembly of the printer at ISI, the company that manufactures this machine for Raster Printers.

This flatbed UV-curable flatbed printer is hand-made in the USA.

INSTALLATION OF THE PRINTER: INSTRUCTIONS & MANUALS

73. How many manuals are available?
Currently there is a User's Manual, available both in hard-copy and on CD.

74. Is there a Site Preparation Guide? If so, is it helpful?
Site preparation questions are in the main user's manual.

75. What is the native language of these guides? Is the translation acceptable?
Since this printer is made in the US, the user's manual is in understandable English.

No matter how well translated, all translations done by a speaker for whom English is a second or third language should have the translation proof-read by a native English speaker. If a company is selling printers into the US, the translation needs to be fully and completely comparable to spoken English, not literal English.

76. What kind of cut-away drawings or other drawings exist that show the various parts of the printer?
The best exploded views of any product in the world are those by Canon camera.

77. How hard, or easy, are the manuals to obtain BEFORE you buy the printer?
Some printer manufacturers hide their manuals because they don't want anyone to see them. Yet MacDermid ColorSpan offered their manuals openly on-line (on their web site). So the policy varies by manufacturer. We do a full report only on those printers where the manual is available to us.

TRAINING

78. Is training necessary? Is classroom training available?
Classroom training is not common. However Raster Printers start training in June 2008. It is service training.

79. Is factory training available?
Yes. It is available.

Factory training is rare, though some companies do welcome factory visits, and a few companies do indeed offer training at the factory.

80. What expenses do you have to pay relative to training? Is training at your site (so you have no transportation costs) or do you have to send your people to be trained at the manufacturer (you have to pay airfare, hotel, and meals)?
For training at the factory you just have to cover your hotel, transportation, and meals.

TECH SUPPORT & WARRANTY

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

82. Does it include parts, labor, printheads?
What is included is being decided.

83. Who does repairs? Dealer, manufacturer, distributor, or third-party?
The problem with dealers is that their level of support may not be as consistent as that of the manufacturer. Whereas in some cases the dealer may be more agile and faster. But Raster Printers headquarters in California will back-up any end-user who feels he is not receiving adequate support by any dealer.

CLEANING & MAINTENANCE NEEDS

84. How is head cleaning accomplished? Spray, vacuum, manual, other?
Spray (purge).

85. Is there a capping station?
No.

86. Where is the service area, at the left, or at the right?
The service area is at the left.

87. What is the nature of the service station?
 The ink purges into a disposable tray with absorbent material.

The cleaning area is at left. Here you see the purging tray and the two UV lamp heat sinks.

88. Is the service area the same as the parking area?
Yes, it is all at the left.

89. Does this printer spit, or "weep" ("flash") at regular intervals?
Yes, the printer spits when idle; spit frequency can be set by software.

90. Do you need to have a band of printable colors along the edge, outside the main printed area, to keep all printheads and their colored inks fresh and ready to print (so as not to dry out when not be used by the colors in the design)?
The software has the capability but such a band of colors may not generally be needed.

91. What about waste containers to hold the purged ink? How much ink do they hold? How often do they fill up?
Rather than a waste bottle and plumbing system, there is just a simple tray under the purging area.

92. How often do you have to empty the waste ink container?
You can empty the tray perhaps twice a month.

Parking area is at the left, same as service area. Below the purging area there is a waste tray.

93. Where is the waste ink container situated?
The waste tray is under the purging area (the service station and parking area).

MAINTENANCE

94. What daily maintenance is required at start up in the morning?
 Prime the heads, 10 seconds per head.

SAFETY & HEALTH CONCERNS

95. How much odor is emitted by the photoinitiators or other aspects of the UV-ink or curing process? How much subsequent outgassing is there, and for how long does the stuff smell?
All ink emits odor (even water-based), but if you ventilate the printer and the work area the smell is manageable.

96. Is the machine enclosed, or exposed?
The gantry itself is exposed.

97. Does the hood close down completely to seal the system, or are there a few inches open at the bottom?
 There is no hood.

98. What keeps UV lamp light from leaving from the space between the bottom of the hood and the platen or transport belt?

There is nothing specific to keep severe light from leaking but I did not notice anywhere near the problem (with serious light leak) as on the Oce Arizona 250 GT, which had the most blinding light leak of any printer at every trade show.

### 99. What is the noise level, primarily of the fans for the vacuum?

Normally the vacuum pump is the noisest part of any UV-curable flatbed or combo-style printer. Roll-to-roll UV printers do not need as much vacuum table area so are not as noisy in this respect.

100. How easy is it to obtain the MSDS of the ink?

It is rare that the MSDS of the ink is easy to obtain. If the MSDS is an auto-download from the company website, this is how it should be. But most companies do not wish the end user to know which brand of ink is being used, so hiding the MSDS is not necessarily an attempt to hide the dangers, but may be to hide the source of the ink.

101. How is the UV light shielded so it does not burn the eyes of the operator? Does operator have to wear safety glasses?

The vacuum table is a dark color, which helps minimize reflection. The tables of Oce, Mimaki, and others are bright polished (aluminum?). That makes no sense to have an almost mirror-like surface directly below your UV lamps.
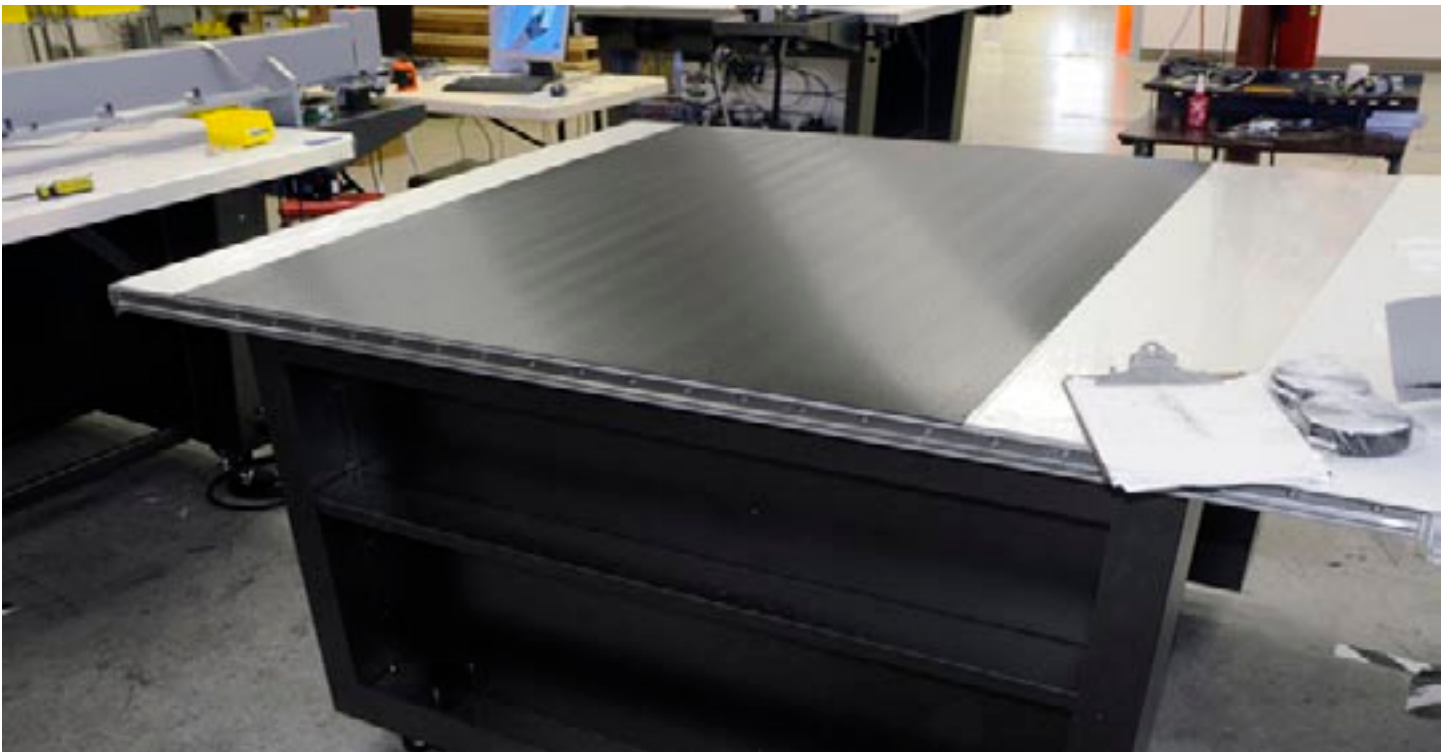
The advantage of the dark surface of the flatbed table is that it does not reflect as much of the UV light as a white or chrome table.

102. 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

103. Which brand printhead is used?
Spectra, now known as Fujifilm Dimatix.

104. Which model of printhead is used
M Class MEMS technology heads. Indeed this is the first UV-cured inkjet printer in the world to utilize this new concept.

105. Is the printhead identified in the spec sheet brochure by brand or also by model, or not at all?
Raster Printers proudly lists all the details of the printhead clearly in the brochure.

Mimaki and Oce do not list their printheads, nor do they identify them if you ask. But once you buy the printer obviously you will find out what brand they are. And if you are in the industry it will take you an hour or so to learn which heads are in the Mimaki. It took me a bit longer to learn which are in the Oce printer. We publish these printhead specs in our respective reports on Mimaki and Oce because if a print shop is about to pay over $100,000 to buy a printer, and if they are expect to choose between six different brands and models, it is logical that they want to know about the printheads before they make their final decision. In fact, for cars, in the US, it is not legal to hide the name of the manufacturer of major components of the car. This law is a result of a lawsuit of a man who bought a Cadillac, found out the engine was just a rebranded Chevy engine, and sued, stating he had bought a Cadillac and expected that everything in his car would be a Cadillac. Both Mimaki and Oce use heads that are at the elite level of a Cadillac, so there is no need to hide their brand name.

106. Is only the printhead used by itself, or is an entire electronic assembly also from the printhead manufacturer?
Raster Printers obtains the entire "HEX" assembly from Dimatix: this consists of
- Head controller electronics.
- Heater associated with the printhead for the ink.
- Plate on which the heads are mounted.
- The MEMS heads themselves.

107. Is this a printhead adapted from solvent ink or a new design made especially for UV ink chemistry?
This printhead is so new that not many other printers yet use it. So this is not a left-over head from the days of solvent inkjet printers.

108. How many other printers utilize the same printhead? Have they shown any problems?
The quarter-million dollar L&P Virtu HD8 uses the same MEMS printheads, but not enough of this impressive UV printer have been sold to allow much feedback. By the time you are reading this report on the T660, I will have been a guest at the Leggett & Platt factory in Ft Lauderdale to inspect their printer.
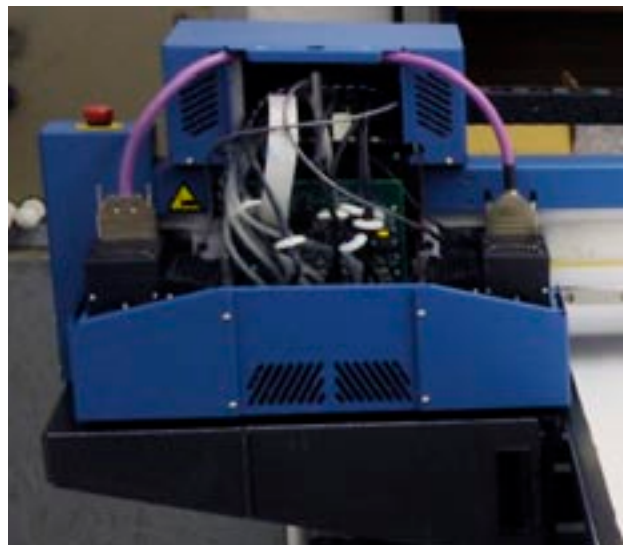
The Spectra M Class printheads are placed in a straight row. Here you see the carriage uncovered, but as you can see below, it does have a cap.

109. What are the benefits of this printhead?
This printhead is newer and in many ways more sophisticated than those of Toshiba Tec. The main benefit is excellent print quality, especially for text.

110. What are the downsides of this printhead?
Downsides are that MEMS heads are difficult to manufacture (yield is low), so there may be a shortage of heads at times. Manufacturing yield was also an issue with the X2 MEMS printheads of Scitex Vision (from PixDro). But the PixDro-Scitex head (part of HP for the last two years) is a slightly different technology and has other issues besides low yield. "Yield" means that out of x-hundred heads that are manufactured, only meet the specs and only these few are used in printers which are sold.

111. How many nozzles per printhead?
304 nozzles.

112. How many total number of printheads?
6 printheads.

PRINTHEAD DPI & Features

113. What is the drop size in picoliters?
Present smallest drop size is 10 picoliters.

114. Is there variable droplet capability?
Droplet sizes are 10, 20, and 30 picoliters for this new Spectra printhead. Grayscale technology to accomplish this will be implemented in the future.

In comparison, droplet sizes for the Toshiba Tec head used in the more expensive (and larger) Oce 250 are "from 6 to 42 picoliters."

115. 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?
The dpi is stated to be "true 1080" but there is not yet any definition (in the spec sheet) of how many passes that requires, or what the real dpi of the printhead is (at one pass). But if you understand how dpi is calculated, you just need to ask the simple question of how this is calculated. You then get the appropriate answer, that six passes achieves 1080 dpi.
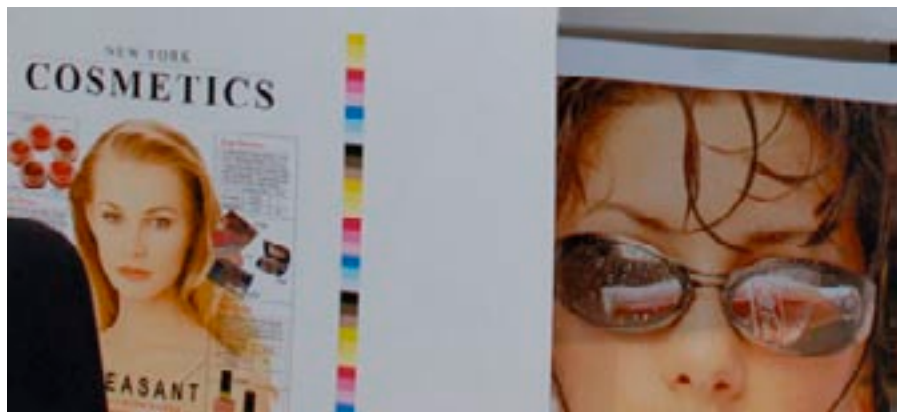
Some of the samples at FESPA 07 displayed excellent precision on really small text. Due to the print dimensions, this printer is ideal for POP signs, where quality and small point text are needed.

116. What is the true dpi of this printhead? If the spec sheet uses the concept of "perceived dpi" or "apparent dpi" how they calculate perceived dpi instead of true dpi?
FLAAR lists the real dpi of a head as the number of nozzles per inch, which in this case is 180 nozzles per inch. But it gets complicated quickly, since some printheads have more than one row of nozzles, most printers have more than one printhead per color, and no one expects much dpi on a single pass. These are several of the reasons why there is no industry standard for dpi, much less "true dpi" or "apparent dpi."

Thus it helps, any time "true dpi" is listed, if the manufacturer will simply indicate, in a footnote, how this is calculated. An even better way would be to show line drawings, the way Canon does best for its cameras, and to some degree for their iPF wide-format inkjet printers. Schematic drawings of this nature, with candid text, would remove much of the uncertainty.

117. How many passes can this printer achieve?
You can do at least up to 16 passes.

118. How does the resolution of this printer compare with other brands or other models of the same brand?
Since all other flatbed printers are larger, and roughly twice the cost, there is not much to compare it with. The smaller of the recent flatbed Mimaki printers would be the most comparable; it has variable droplet Toshiba Tec heads, with awesome potential resolution. The Spectra variable droplet grayscale technology is too new to have comparative data at present.

Bi-DIRECTIONAL VS Uni-DIRECTIONAL PRINTING

119. What is the direction of uni-directional printing? From right to left, or left to right; or both?
Left to right.

120. Is the sequence of ink color laydown the same coming and going? (rare). Or is the sequence of colors bi-directionally a different sequence than uni-directional? (the usual way).
The sequence of color laydown requires two heads per color to be mirrored, so with one head per color the sequence of color laydown is different when printing left to right as it is from right to left. So the software needs to do interweaving to balance the resulting colors.
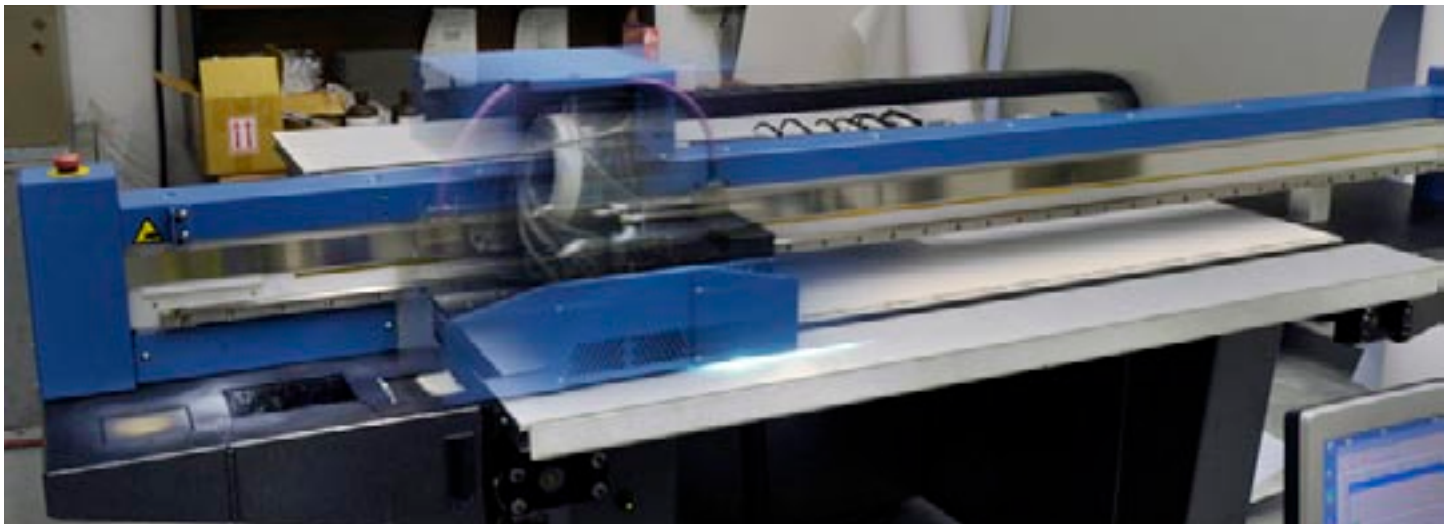
The carriage moves from left to right. When setting the number of passes, keep in mind that for all printers, the more passes, the slower the machine prints: the production time depends on the level of quality you wish to achieve.

PRINTHEAD Positioning

121. What is the position of the printheads relative to the media? Above, jetting down (the common position) or alongside, jetting horizontally (rare)?
These printheads come in a cluster of six, "Dimatix M-Class Hex Modular Printhead, with integral ink reservoirs, heaters, and sensors for the ink level." By having all this built by Spectra it saves the printer manufacturer from trying to reinvent the wheel by themselves.

122. Are the printheads in a straight row, or staggered?
Single row.

123. Do you raise the heads manually, with click stops, or motorized? Is there an alarm system to stop the head from hitting substrate if head is not high enough?
Head height is changed manually. No alarm, but the system knows the height of the head, so the monitor asks for confirmation to see if things have been set appropriately before it starts. However you have to be careful of materials that are not really flat (but thicker in the middle, which would cause a headstrike there), or material that bubbles up due to the heat of the UV lamps.

But if the nozzle plate is harder than steel, and if the LED lamp cuts down on heat, there should be less bubbling, plus that issue (of budding) is more with roll-fed materials.

PRINTHEAD: Associated Features

124. Is ink heated in a buffer or elsewhere before arriving near the printhead?
Heating is part of the sub-system that comes with the printhead assembly from Spectra.

125. What is the firing frequency (voltage) of the printheads (in KHz)?
This is a fast head, operating at up to 40 KHz.

126. Can the firing frequency be varied by the end-user?
Yes.

127. What is the effect of changing the firing frequency of the heads?
Changing the firing frequency of a printhead is directly related to the speed of firing. Higher frequency = higher speed. For example, Xaar heads are traditionally listed as being slow.

128. Is negative pressure required to maintain the ink (without the ink dripping out the printhead when the machine is turned off)?
Most UV printers use a slight negative pressure on the printheads, to keep the ink from dripping out when not in use.

PRINTHEAD Life Expectancy

129. What does each printhead cost to replace?
 Roughly between $1500 and $2000. If failure is the fault of the printhead, this replacement is covered by the warranty.

130. Is the printhead user installable?
No, printheads should be installed and replaced by a qualified service technician.

PRINTHEAD CARRIAGE and GANTRY

131.Describe the design and construction of the carriage area?
Rak Kumar has many years of managing wide-format printer companies, so he knows all the design aspects of a printer. If you wish to learn some of the jargon and design features of a UV-curable printer yourself, it is worth visiting the booth where he exhibits (generally the booth of EFI). While I was in the ISI factory on the assembly line of the T660, he explained to me that the carriage must be able to be aligned by roll, pitch, and yaw. This is the align the carriage itself. Then the individual printheads also require a method to align them as well, individually.

132. What moves the carriage?

The carriage is moved by a metal band (a belt). The band traverses across the front of the main bridge of the gantry structure.

This is the bridge of the gantry where the printhead carriage will move in X direction.

133. What moves the gantry? Lead screws?

One slender lead screw on each side of the table provide movement for the gantry. These screws step the gantry by screw motion, driven by a servo motor. There is one servo motor for each lead screw.
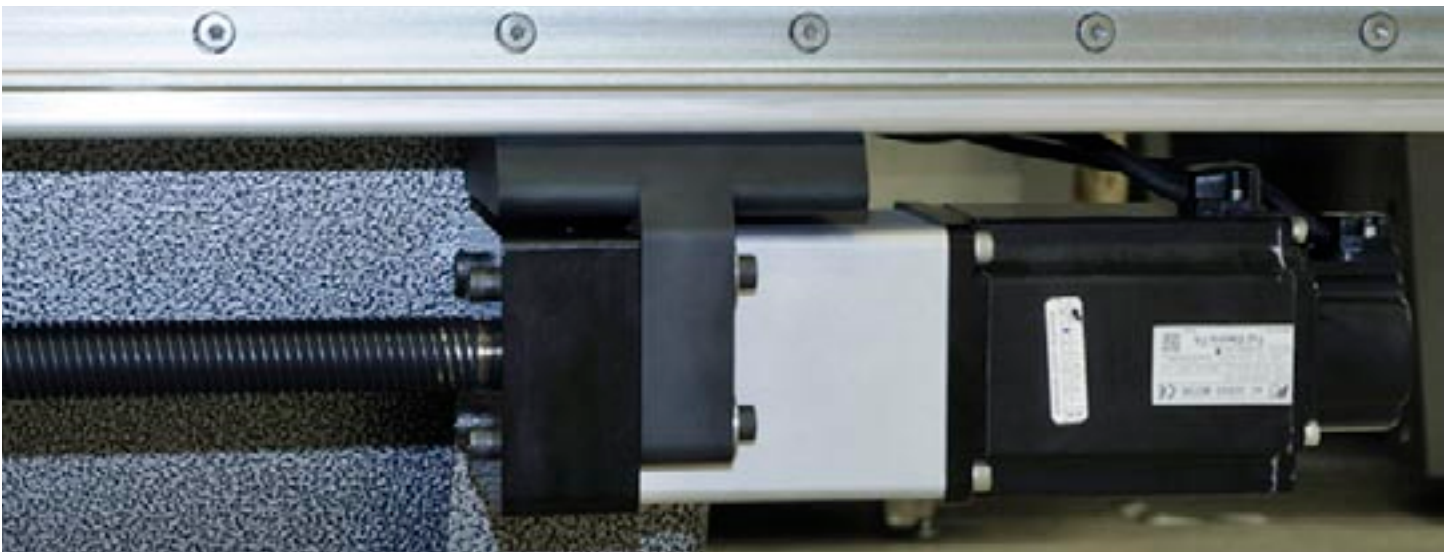
As discussed earlier in the section of FLATBED ASPECTS (for dedicated flatbeds), there are two lead screws, –one on each side of the table– that move the gantry, not the table. Here, you can see one of the servo motors that control the movement of these screws.

134. Do these lead screws need to be lubricated, or are they Teflon coated?

Raster Printers uses lead screws that are Teflon coated.

Note: the Igus e-chain, motor drives, and other aspects of the carriange movement are discussed in other sections.

SUBSTRATES

135. What sizes of material can be printed on?
60 x 48 inches, which is 1.52 x 1.22 meters.

136. What thickness can this printer handle?
Two inches.

137. What materials does the manufacturer list?
The initial brochure lists
- Fome-Cor
- PVC
- Styrene
- Corrugated plastic (such as Coroplast)
- Plywood
- MDO
- Aluminum plastic composite
- Cardboard
- Paper
- Aluminum
- Acrylic
- Glass

But there ought to be a footnote for acrylic and glass, relative to adhesion issues.

Nicholas Hellmuth and Rak Kumar at FESPA 07. The moderate size makes this a UV printer for specific applications or for a printshop in a mall, where space is limited.

SUBSTRATES, Issues

138. What materials can this printer print on perfectly?
PVC looks very nice.

139. What materials can this printer not print on at all?
Fibers can cause problems with printheads.

140. Can you print on mirrors?
It is not advisable to print on mirrors or comparable highly reflective surfaces.

141. 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?
Be careful with very thin materials, which are sensible to heat. The vacuum can also be a source of problems for thin media.

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.

Nicholas Hellmuth shows samples of FLAAR archaeological archive printed on with the EFI Rastek T660 at ISI facilities. The images of Maya ethno-botany and ethno-zoology are from the FLAAR photography of thousand-year old artifacts from the Ruta Maya Conservation Foundation.

142. 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 need to use a fabric softener –Downy-for example, which you can get from the supermarket.

You do need to be aware of how to prevent static electricity build up:
- • No carpets or rugs on the floor.
- • 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).

143. 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

144. How often is pre-treatment required, either receptor coating or other special surface treatment to the material to be printed?
Scooter board (a compressed board in the middle with plastic surface) does not need pre treatment when using Triangle inks. This material is used instead of Coroplast by some people for real estate signs, etc. But this is not the case of all materials. Raw aluminum needs pretreatment.

145. 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.

Print from the T660 on showing felines on ceramic effigy vessels, circa 900 AD, from the Ruta Maya Conservation Foundation.

SUBSTRATES: General Concerns

146. What problems in feeding exist, such as skew to one side?
Skew results on other kinds of printers because no one single feeding system can accommodate all kinds of surface characteristics or thicknesses of materials. The propensity on hybrid or combo printers for skew is precisely why more and more manufacturers are offering true dedicated flatbed printers. There is no way for materials to skew on the EFI Rastek T660 printers or on any other dedicated flatbed.

147. What about edge-to-edge printing (borderless)?
Yes.

APPLICATIONS

148. Can you print on textiles or fabrics? How do you handle the ink that gets through the weave?
Not many users do this.

149. What other kinds of applications can you print?
• Billboards (good on most materials, because viewing distance is far).

• Banners, general signage (good on most materials, because viewing distance is far).

• Exhibit graphics; okay if viewed up high or 2 meters away; may be considered too grainy for close viewing.

• Backlit; okay if viewed from far away; too grainy and banded for close viewing. You get better backlit with the "camera" system on the Jeti solvent printers.

• POP; slightly grainy and may have banding, only suitable for close viewing if client or customers accept the output.

Rak Kumar and Nicholas Hellmuth showing a print sample at FESPA 07.

• Vehicle graphics; not ideal for sharp edges or extreme curves. Use the roll-to-roll UV printer with its flexible ink.

• Bus shelters, okay if average viewer is not discerning.

• Rigid materials are good for construction signs. Ideal for MDO boards and comparable materials for construction signage.

• Magnets.

• Luggage tags for golf courses.

150. What kinds of applications are not something you should try? What applications print mediocre, and why?

The biggest problem with UV-cured inks on vehicle graphics is when the material has to stretch or conform to the shape of the vehicle, especially over rivets, decorative trim, or anything that is not flat. Most UV printers are not recommended for vehicle wrap unless they use a special ink made to be flexible. Also be careful by making sure that adhesion and cleanser-resistance is adequate.

That said, today (2008) the inks are a lot better and you can consider experimenting with UV-curable vehicle wrap. However you would not tend to print vehicle wrap on a dedicated flatbed system.

151. To print backlit can you set a mode for double-density?

There is not an actual mode, but you can profile to put down more ink or do more passes.

152. Is there a system for assisting double-sided backlit printing?

You can mask the media off by hand.

INK

153. Is there a special ink for flexible material, and another ink for rigid material? What other inksets are available? Is there any choice in inks?

As with most UV printers there was only one ink in the beginning, in this case for rigid materials since this printer can't take roll-fed material. But currently there are two inks:
- Standard ink (from Triangle)
- Flexible ink, for membrance switches and potentially for thermo-formable objects too.

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

Yes, both thermo and flexible, all in one ink.

155. If there are two inks, how difficult is the changeover from one ink to the other?

You have to purge out ink, but you don´t need to flush.

156. How many colors are used to produce output - four, six, or eight?

There are two modes: a traditional 6-color mode, and CMYK + White + Varnish. But I would recommend using dual white since varnish is iffy even in a $350,000 Durst Rho.

So, this printer is more versatile than other flatbeds which have no possibility of white, varnish or six colors.

With the EFI Rastek T660, you can choose between having CMYK +lc+lm or CMYK + W+Varnish, or CMYK+2W.

157. What company makes the inks? Choices include DuPont, Jetrion (Flint), Sericol, Sun, Triangle, KonicaMinolta, Tetenal and several others.

Triangle ink company and ISI (the manufacturer) are both owned by Sakata INX. So it is no surprise that Triangle ink is used as the ink for rigid materials in this printer.

INK: White & Varnish

158. Is white ink available?

Yes. White ink is definitely a plus compared with other entry-level dedicated flatbeds, which configuration was designed to be only CMYK.

159. To use white ink does that require not using light colors in order to make space for the white ink?

Yes, you have six ink channels: you can select CMYK + 2W or six colors.

160. What is the sequence of printing the white ink? Can you print all white and then print colors on top?

You can set the printer to select
> a. White first, then the other colors
> b. Colors first, then white.

Since this is a flatbed machine, you can run over the same area several times.

161. How many ink lines or printheads are dedicated to white ink? One or two?

Two printheads are needed so your white is opaque enough.

162. Is the white ink opaque enough?

You would need to see print samples of the white to determine if it is opaque enough; we would recommend using two heads for white.

163. What is the shelf life? Does the white ink need special attention? (Titanium dioxide may settle out if it sits too long). What company provides the white ink?

Shelf life of white ink is six months.

164. Is spot varnish available?

Yes, and no; spot varnish may be available in the future but the owner of other brands of more expensive printers comment that their spot varnish does not always work satisfactorily. So I would want to see print samples before I got all set to accept a huge job that demanded spot varnish.

INK Cost

165. Does ink come in cartridges or bulk? How large are the ink containers for replacement ink?

The ink is in half-liter bottles.

166. What is the cost per container? What is this cost translated to liters?

Ink is $99 for a half liter which means just under $200 for a full liter. If I remember correctly, this makes the ink less cost than that of Gerber, less cost than Mimaki. I do not yet have the price of the ColorSpan ink now that HP took over, but the rule is: the cheaper the printer the more expensive is the ink: the more expensive the printer, the less cost the ink is. With the T660, the price of the printer is reasonable and the cost of the ink is below that of most other entry level printers.

The white ink is $120 for the half-liter bottle, so $240 for a full liter.

167. How much ink is used to print a square unit?
1/10th of a milliliter per square foot

168. What is the cost, in ink, per square unit?
Drop size can be varied from 18 to 204 pl. The smaller the drop, the less the cost of ink.

169. How many square units does 1 liter of ink print?
1000 square feet.

170. What is the ink usage compared with a solvent printer?
In general, UV ink will be more expensive than solvent ink, but a solvent printer will use a lot more ink than a UV machine.

171. How do you know when the waste container is full?
Since you can look at the waste ink tray at any time, you can estimate when you feel it needs to be emptied.

172. How can you see the remaining ink level?
There is no option to see the ink levels. The software only tells you when you´re out of ink.

173. Is there an out-of-ink alarm? Is there a warning before actually being out of ink?
When you run out of ink, you see a message on the screen.

174. Does the printer send an e-mail message (a nice touch if the printer is operating unattended at night)?
No e-mail message; no message to your cell phone either (the Durst Rho 800 sends a message to your cell phone).

175. Can you hot swap the ink (refill with ink while the printer is running)?
Yes, it is possible if you are adept enough, but be careful with the gantry.

INK: Supply System, Tubing, Filters, etc

176. How much ink does the ink container in the printer hold?
The ink in the printer is in the same half-liter bottles as the replacement bottles that you buy.

177. How is new ink added? Pouring into the on-board container? Switching the container to the new ink container?
You simply switch bottles.

178. How do you avoid building up old ink inside a large container?
Since you switch from the old bottle to the fresh new bottle, unless you pour the remaining ink from the old bottle into the new bottle, you will not have old ink sitting around to potential gel at some point in the future.

179. What filters are on the ink system to trap particles or trap gelled ink?
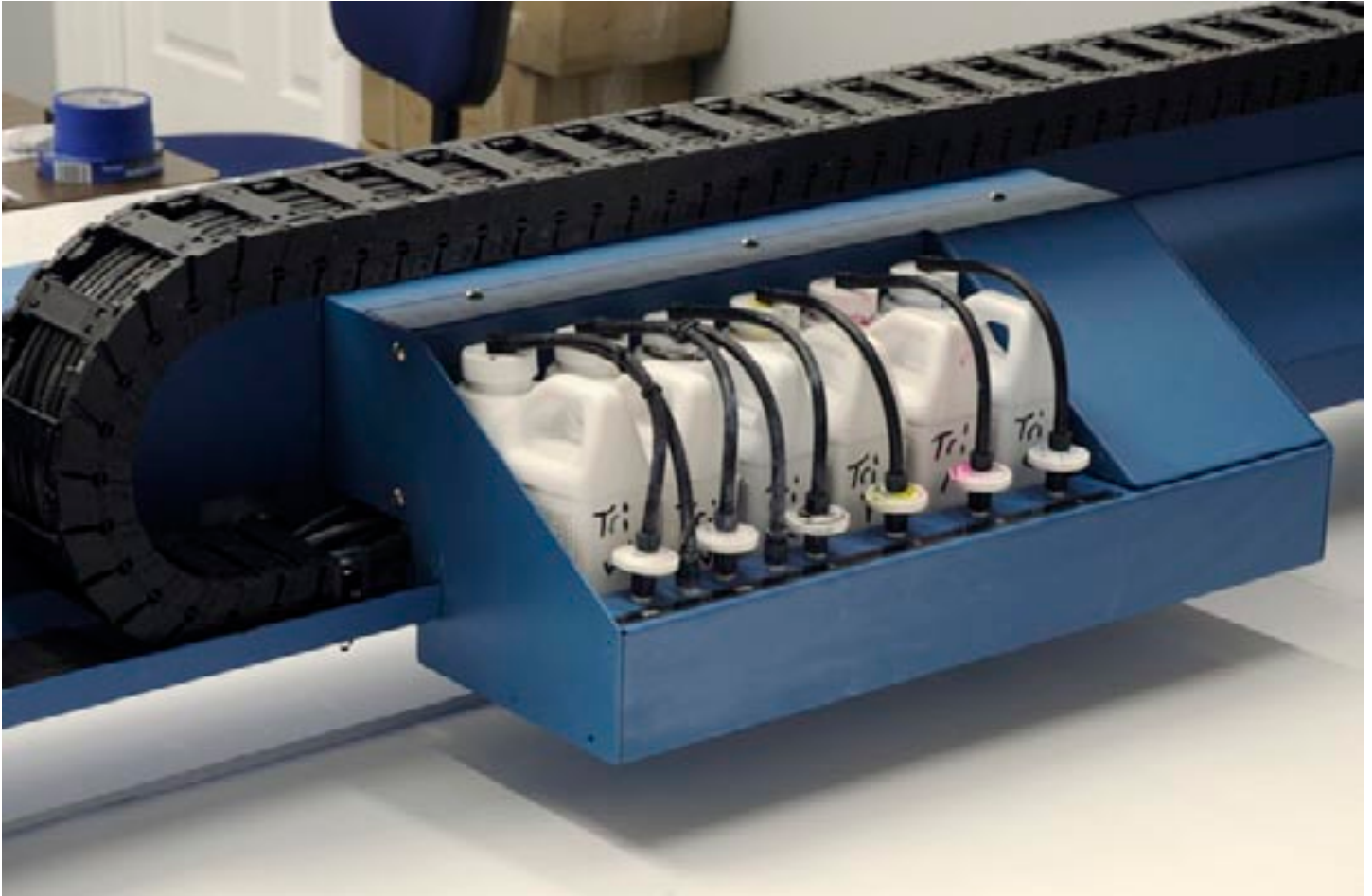Pall filters are used: two of them per ink line. One filter after the ink bottle; a second filter before the printhead.

180. How often do the ink filters have to be checked? Cleaned? Changed?
It is best to change the filters after every 12 liters of ink have passed through them.

181. What does a new ink filter cost?
$3.

The ink containters sit on a stationery fixed box at the back of the bridge.

182. Describe the ink supply system (to the printhead)?
Because the engineers situated the ink bottles physically attached to the carriage, there is no need to have the Igus e-chain bring ink lines up to the carriage's X-axis.

183. What kind of ink pumps are utilized? What brand? What capacity?
This printer uses ink pumps from Switzerland: KNF brand.

184. 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.

This printer has no record of ink starvation that we are aware of.

185. What kind of e-chain is used? Igus brand?

The energy chain is the plastic linked system that holds all the cables and ink tubing so that it does not get rubbed while being moved back and forth to feed the carraiage.
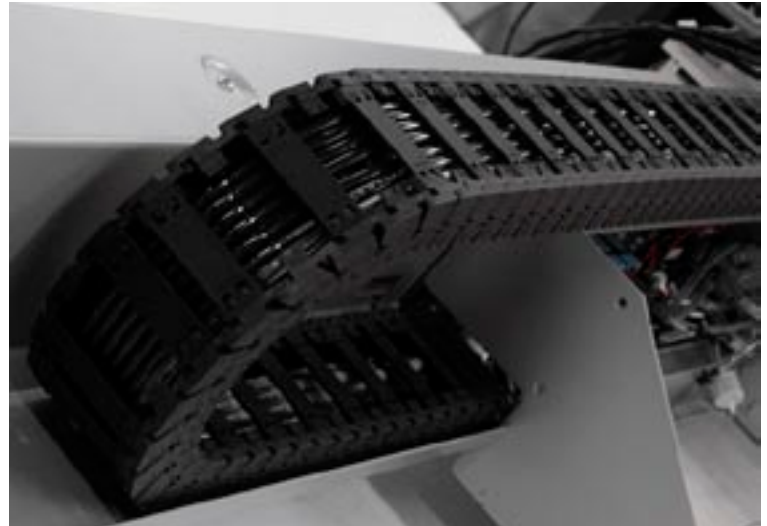
e-chain.

186. To what degree is the ink heated?

40 degrees Celcius.

187. How long does it take to heat the ink in the morning at startup?

A couple of minutes.

188. Has any misting or spray been reported? What about ink inside the machine parts?

Not yet seen, but consider that the highest the printhead carriage, the more likely it will be to get mist.

INK: Longevity

189. To what degree can you expect cracking of the resultant image if on a flexible substrate?

If you intend to print on flexible or thermo-formable material, it is advisable that you use the adequate ink.

190. 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?

Do not wipe with alcohol right after printing.

- 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

THE UV CURING LAMPS

191. How many different sets of lamps are there? Is there pinning first and then curing later?
The original prototype of this innovative printer had one mercury arc UV lamp at the left and one set of LED lights at the right. That was over a year ago.

192. What technology is used in curing lamps: microwave, continuous (mercury arc), or flash (pulsed Xenon)?
The production model uses two mercury arc UV lamps (no more LED).

This picture was taken in 2007 at ISA trade show. At that time the printer used one mercury arc lamp at the left and a LED light at the right. As you will see in the following page, the lamp configuration has changed since then.

193. How many watts are the lamps?
600 watts for each individual lamp.

194. What brand of lamp is used?
The lamp assembly is from Integration Technology but the electronics and power supply are from ISI (in other words, from the company that contract-manufactures this printer for Raster).

195. How many lamps does the printer use?
Two.

196. Can you have one lamp on one setting and the other lamp on another setting? Or do both lamps have to be on the identical setting?
There is a variable power control on UV lamps. They are controlled via software.

197. What shuts the lamps off? For example, after so many minutes of not being used; or if they overheat?
It is timed. The default is 5 minutes. You should wait 2 to 3 minutes before restriking.

198. 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)?
Mercury arc lamps tend to last about 1000 hours. The LED lights can last up to 10,000 hours.

199. 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. Since my PhD is not in chemistry I don't know how much of this time the inks are still curing.

Currently, the printer uses two traditional mercury arc lamps. Raster Printers has gotten rid of LED lamps. Eventually, LED technology will evolve and you will see more printers using LED lamps, but for the time being, not many UV printers have been successful with LED lamps.

UV LAMPS: Cooling

200. Are there shutters?
There are no shutters.

201. How are the lamps cooled? Air? Fans? Water-cooled?
This is a dual quartz system. Air goes between the two layers of quartz to cool the UV light by the time it reaches the substrate on which the ink is printing.

202. How many fans are there per lamp?
There are two sets of fans to cool the UV lamps: the assembly from Integration Technology uses its own fan(s). Then ISI adds a second set that directs air in between two plates of quartz that are on the front of the lamps. The curing face of the quartz is thus an extra quartz plate (not present on the original system from England). There is also a screw-drive to allow turning to raise or lower the lamps.
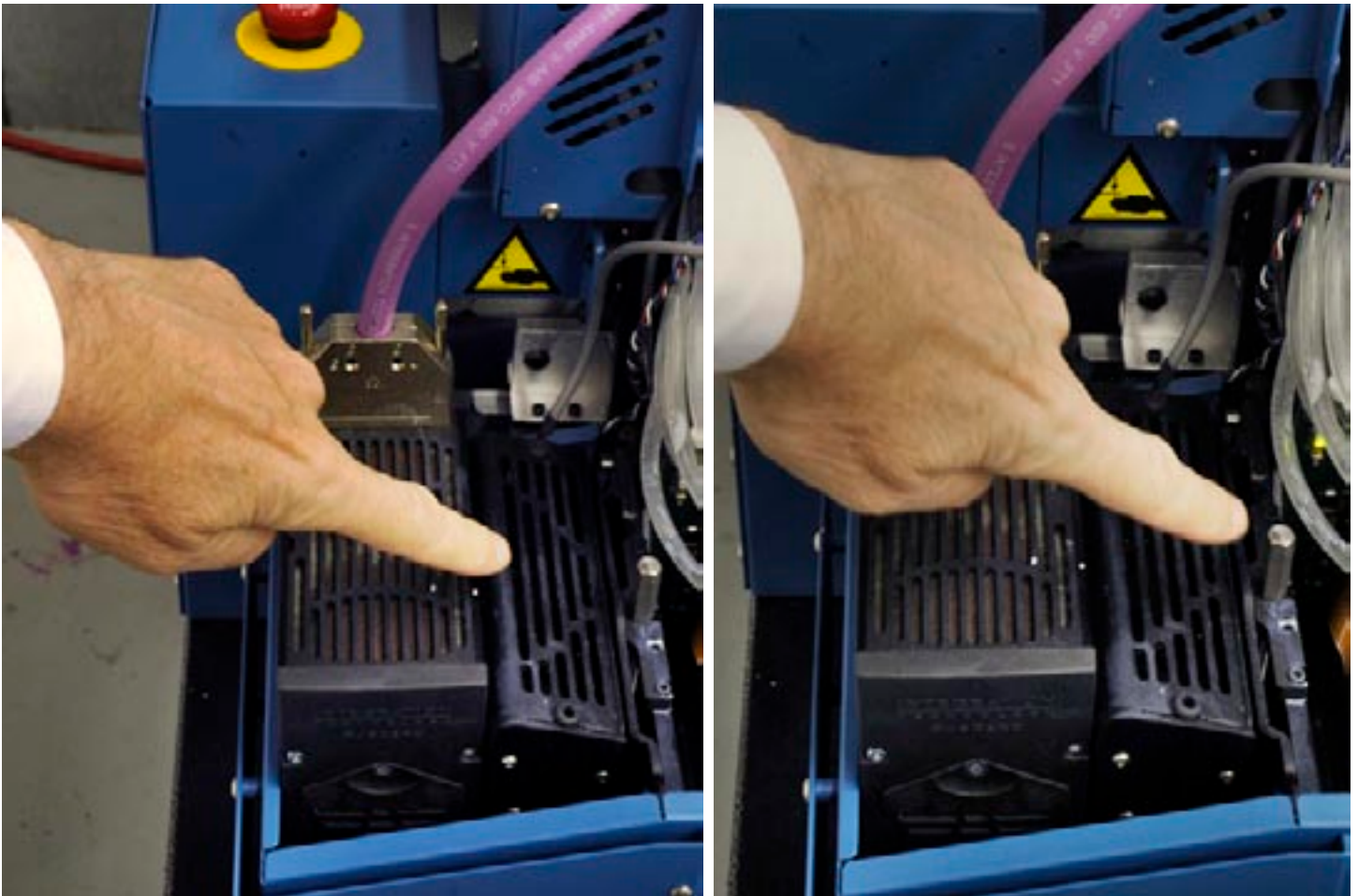
ISI incorporated extra fans at the sides of the custom lamps from Integration Technology. At the right, you can see the bolt to move up or down the UV lamps.

203. In the areas at left and right of the printing area, is the surface specially protected against the extreme heat?
Yes, there is a heat sink (pit) for each lamp to park on top of. These are on either side of the maintenance station.
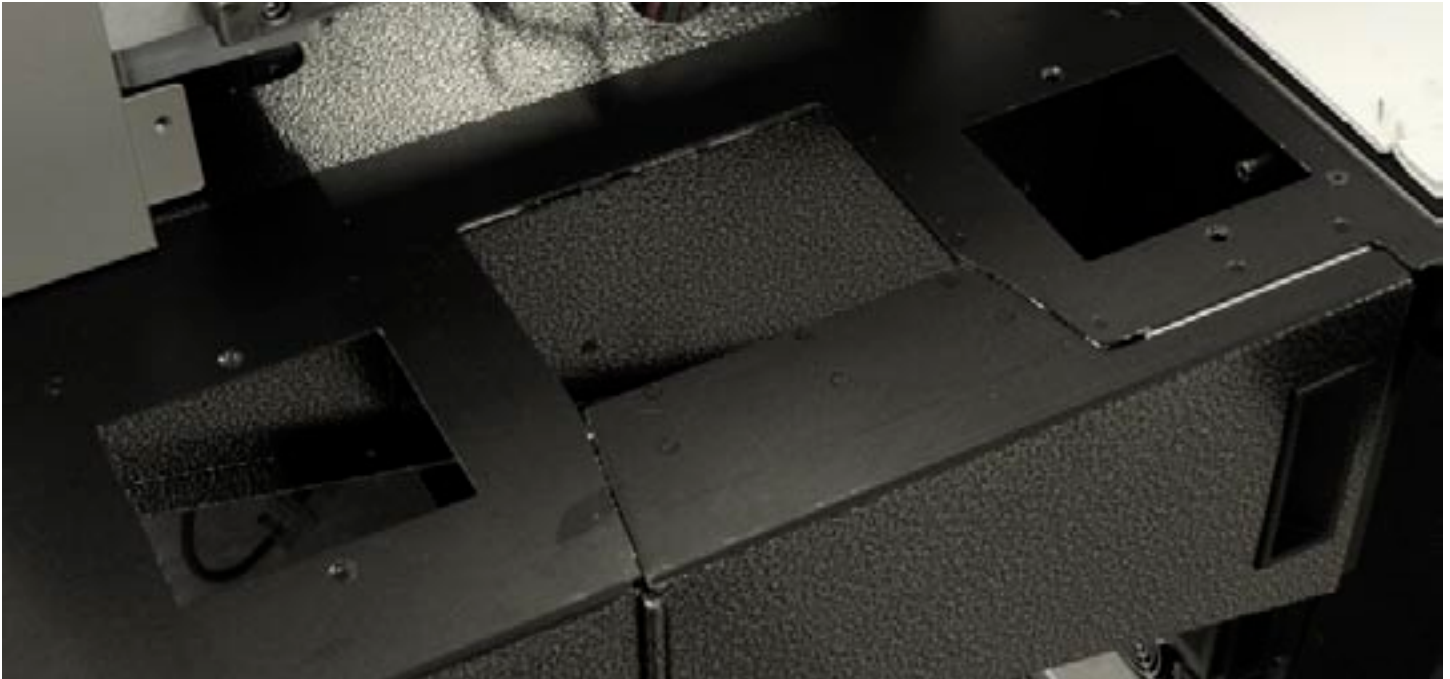
The lateral holes-located in the parking station-are the heat sinks for the lamps.

At the back of the carriage there is a secondary fan system.

RIP SOFTWARE & Printer Software

204. Does the price of the printer include a RIP? If a RIP is included or part of a package, is it a lite RIP or a full-featured RIP? Can this RIP be updated? Can it run any other printers?
Onyx PosterShop or ProductionHouse are optional upgrades to the base price.

205. Is a computer and monitor included (to run the RIP)?
You receive a Dell computer and an LCD monitor of reasonable size.

COLOR MANAGEMENT FEATURES

206. 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 UV printers and ColorSpan UV printers are the only UV-cured ink flatbed printers that we know of that offer color management features actually built inside the printer.

PRODUCTIVITY & ROI (Return on Investment)

207. 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: Anything Misleading? Any Hype? Slight Exaggeration?

208. Are there any problems serious enough to have caused serious complaints to either resellers or the manufacturer relative to color management, mechanical aspects, printheads, banding defects, skewing of media, incompatibility with inks or media or other aspects that could be deemed pertinent?
There was one early customer who had to replace many heads because there was leakage of ink into the electronics of the head. But this kind of issue, once it is known about, a solution is worked out.

GENERAL CONSIDERATIONS

209. How many printers of this model are in use; in the USA; in the rest of the world? Not how many are in dealer showrooms, not how many are in beta test sites or are considered to have been "sold" on paper, but how many are functioning and producing output in commercial establishments.
Prior to DRUPA about 27 printers were sold. Of these about half were sold to Europe.

DRUPA was a windfall because the printer was displayed in the EFI booth (albeit stuck in the back because VUTEk naturally wanted the front). Despite being relegated to the back (and hence invisible to anyone walking down the aisles), Raster Printers was able to sell about 30 units. In comparison, Teckwin sold almost this number despite being very difficult to locate and in a distant hall. Even with a map, and even knowing the booth number, DRUPA was poorly organized for visitors.

Gerber claims to have sold 5 ion flatbeds during the two weeks at DRUPA in a prime location (at crossing of two major aisles), in a very busy and centrally located hall. If the T660 had been in the same kind of prime location I wager it would have sold another 12 units.

At FESPA Mexico Gerber sold one single printer; Raster sold several (definitely more than Gerber and more than Mimaki since there was not one single Mimaki flatbed printer at that show in August 2008).

COMPARISONS WITH OTHER PRINTERS

210. When people are considering buying this printer, what other printer(s) are they also looking at?
In flatbeds, since the Aellora is no longer available, the closest printers in size are various Mimaki printers.

Otherwise the Gerber Solara and the more popular HP Designjet H35100 (formerly ColorSpan 5400uv series) are competition and can do roll-fed as well as flatbed, and cost less than the EFI Rastek T660.

But, if you want a dedicated flatbed printer, with no skewing, then you need a dedicated flatbed design. And if you or your clients absolutely require small text with minimal satellite drops, then you need a printhead that can deliver this quality.
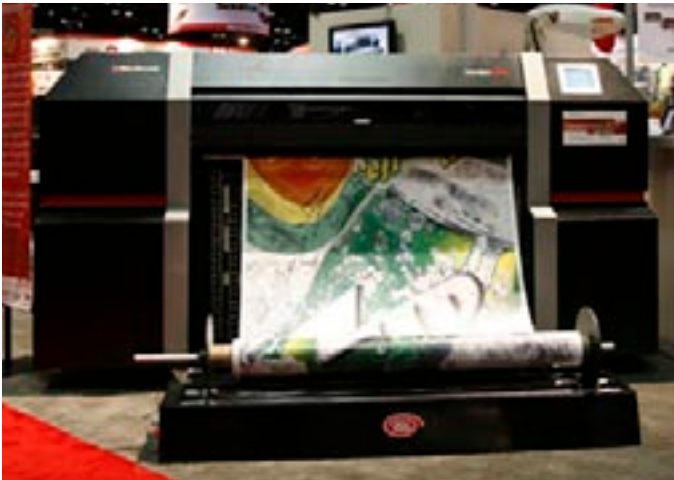
HP Designjet H35100 at SGIA 07. This is a hybrid design, which has an advantage of being acceptable for roll-fed, and okay for some flat materials, but may not be really adequate for some diverse heavy, thick, or innovative materials for interior decoration. There is no skew with rigid materials of any and all weights on the EFI Rastek T660 because this is a true dedicated flatbed. Plus the printhead used in the T660 is significantly more advanced than the printhead used in ColorSpan printers for the last several years. That other head is okay for signage to be viewed at a distance, but the T660 printhead is demonstrably more precise for close viewing (such as for POP). As a photographer, I consider the T660 much better for photographic quality.

If you need a flatbed printer to operate every day, having a real flatbed printer has multiple advantages over a hybrid. You also need to consider resale value and the ability of the manufacturer to provide reliable service. I have checked with an owner of another model of Raster Printers and they were content with the service to the point that while I was in their printshop in Pennsylvania, they were fielding calls from franchise shop owners and recommending Raster Printers to other franchise sign shop owners.

Gerber ionˣ is a larger size, 4x8, and also has a roll-fed appendage, but if you read the FLAAR Report on the ion you will learn the limitations of cationic ink and the problems with cold curing. The FLAAR Report on UV inks per se, has an additional section on the more serious issues of cationic inks (and why no other printer manufacturer has been successful with them so far, at least not outside a lab or factory demo center).

The Mimaki JF-1610 is closer in size to the EFI Rastek T660. The over 45-page FLAAR Report on this Mimaki printer document the pros and cons of this machine based on comments from end-users in the US and Australia.

211. What features on the other printers turn them off?

Mimaki is a well known engineering company, but their JV5 solvent printer had issues the first two years (mainly inability to dry the ink). The JV33 could also not dry the eco-solvent ink so they had to switch back to a mild-solvent ink.

The Mimaki JF-series UV printers, for reasons I do not understand, have little issues and problems that Mimaki has been aware of, and is working on, but not been able to resolve fully. Thus the JF-series of UV flatbeds are not as perfect as I would have expected from a company with such experience.

Plus if the T660 flatbed has a servo motor to move the carriage and if the Mimaki JF-series UV printers have only a stepper motor, that alone is enough to cause banding. The Mimaki uses out-moded Espon-style ink cartridges (for which there is no benefit whatsoever other than that the Japanese engineers know how to handle Epson style ink delivery systems). Plus Mimaki ink is considered expensive. And the final issue is that for reasons that I also fail to understand the Mimaki printer has reputation for wasting ink with purging. All this

shortcomings are regrettable since Mimaki managers whom I know (naturally mainly in Europe and the US) are all capable and have years of experience with printers for signage. Their engineers back in Japan should produce a superior UV flatbed printer, but have not accomplished this so far.

Last year (autumn/winter 2007), Mimaki began to realize that their flatbed was not successful in the marketplace; they attempted to improve it but the system was pre-determined. There is no way to fix every inadequate feature without starting from scratch. By 2008 this printer began the typical steps that happen before a printer is discontinued: they drop the price drastically to get rid of inventory. But the reports we receive from end-users, literally diaries of headaches with the Mimaki flatbeds, suggests that buying one even at half price would not provide a printer that is likely to be successful. Clogging and cleaning of heads is the most persistent complaint by people that have the Mimaki flatbed. As soon as a newer improved Mimaki UV flatbed is available to evaluate, we will revise and update our comments correspondingly.

FLAAR is read all over the world because we are straightforward when it comes to printer issues.

The Gerber ion would have been the major competitor for the Rastek Printers T660, but the Gerber ion failed to print 80% of the time at DRUPA; was withdrawn without adequate explanation from FESPA Digital (and all announcements of it were also not present in the Spandex booth there), and if I understand correctly, the Gerber ion did not appear at a FastSigns event. Plus one of the two Gerber ion printers at the recent sign trade show in Long Beach did not convince many people that it was fully functional.

There are no other small-sized UV printers; the Lotte costs three times the price of the T660. The impressive Screen Truepress 650 costs about half a million dollars.
So, in effect, there is no competition in size or price or really in quality either for the T660 dedicated flatbed printer.

212. What aspects of the selected printer help decide in its favor?
I list all the PROs and CONs of the T660 at the end of this report.

SUMMARY: Image Quality Issues Relative to Applications

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

CONCLUSIONS

214. Are you satisfied with this printer to the point that you would recommend it to someone else?
I would not waste my time spending days inspecting this printer and weeks preparing this report if I did not find that this printer had merit.

215. If so, why would you recommend that others buy this same printer?

There are three stages to a FLAAR evaluation:
- demo room testing,
- factory visit,
- and site-visit case study.

So far I have accomplished initial demo room testing and the factory visit. But most importantly, you should do a site-visit case study(s) to check how this printer behaves in the real world (in a printshop). After a site-visit case study, then it will be possible to update this FLAAR Report with additional documentation. But the two days with the experienced people who were overseeing the design and construction of this printer from the beginning, and the people who are in charge of any tech support that may be needed, provided the impetuous to initiate the process of an evaluation that you have in your hands presently.

CONCLUSIONS

Pros
The size (footprint) fits in sign franchise shops, family owned sign shops, and anywhere that space for a larger heavier version is not available.

Since Raster Printers is a small company, they can afford to provide personalized service.

This printer is designed and manufactured in the USA.

The T660 printer is simple: this is a compliment. A good example of a printer that is complex would be the Agfa :Anapurna XLS, their update of the failed Agfa :Anapurna 100 (FESPA Munich 2005, with the "walking feet" that move the material). A printshop owner in Europe just sent me his report of his evaluation of this XLS combo printer from the Agfa demo room in Belgium. He removed this printer from his short list and even from his full list after seeing how complex it was.

Another benefit of a simple design is that everything is accessible.

The ink lines are also simple: the ink is stationed on the back of the gantry, so you don't need miles of ink lines to pump ink from the bottom or back of the printer.

All the key people in Raster Printers have experience in the world of wide-format inkjet printers.

The T660 printer uses a printhead which offers better quality than many other flatbed printers.

For its price class (entry level), the UV lamp cooling system is probably the most sophisticated of any that I have yet seen.

The top of the vacuum table is a dark color. Most other brands of flatbed printers have brightly mirrored surfaces, which has the bad habit of reflecting undesired UV lamp light everywhere (especially in to the retinas of bystanders).

The T660 offers white ink, which is lacking on about half the other entry-level UV-curable printers.

Downsides
Most larger flat materials in the US and some other countries are 4x8', so that is considered a more realistic size. But not all printshops have space for a machine this large.

Every printer has issues, even brands and models that we like otherwise. As soon as we learn of any problems and headaches with the T660 printer we will update this report.

If you need more information about Rastek (Raster Printers)
Rak Kumar,
408 545-0540
rak.kumar@EFI.com

Most recently updated September 2008.

First issued March 2007.

FLAAR Reports

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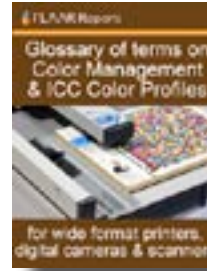
These reports on RIP software and Color Management for serious UV printers are free downloads on all FLAAR web sites (follow the link to 'free downloads')   http://www.wide-format-printers.net/reviews_reports_evaluations/free_download.php

RIP, COLOR MANAGEMENT, and ICC Color Profiles options

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

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

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

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

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

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

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

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

Caldera also offers a highly regarded spectrophotometer from Barbieri, the leading color management company in Italy (they are headquartered in the same city as Durst, the manufacturer of Rho UV-cured printers).
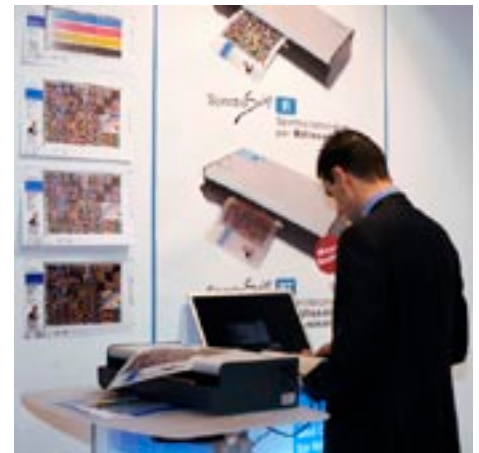
For further information on Caldera contact Joseph MERGUI
mergui@caldera.fr
If you have questions about color management, if you are in the US you can contact: ImageTech at:
www.ImageTechDigital.com
Mark Spandorf (owner and president),
mark@imagetechdigital.com
or 510 238-8905.
If you are in Europe or the rest of the world you can contact **BARBIERI** directly at: BARBIERI electronic snc,
info@BARBIERIelectronic.com
www.BARBIERIelectronic.com
Tel.: +39 0472 834 024
Fax: +39 0472 833 845

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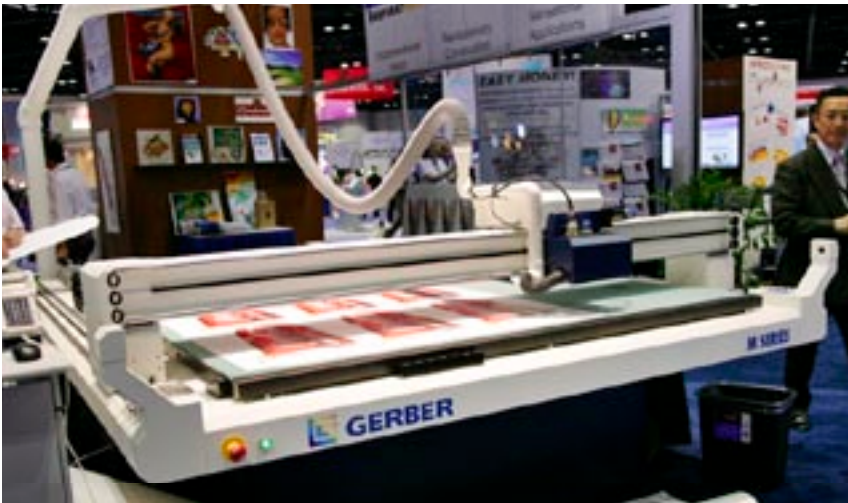
We have seen Gerber cutters at work during major trade shows, both in Europe and in the US. Gerber has dealers all across the US and Canada, and in Europe is served by Spandex.

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.

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

Gerber M Series cutter at ISA '08.

Reality Check

Being a university professor for many years does not mean we know everything. But intellectual curiosity often leads us to enter areas that are new to us. So we do not shirk from entering areas where we are obviously not yet expert. If in your years of wide format printing experience have encountered results different 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).

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Update Policy

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

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

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

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

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

Please Note

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.

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Legal notice

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

Advisory

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

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

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

Or the product may indeed have a glitch but one that is so benign for us, or maybe we have long ago gotten used to it and have a work-around. And not all glitches manifest themselves in all situations, so our evaluator may not have been sufficiently affected that he or she made an issue of any particular situation. Yet such a glitch that we don't emphasize may turn out to be adverse for your different or special application needs.

Equally often, what at first might be blamed on a bad product, often turns out to be a need of more operator experience and training. More often than not, after learning more about the product it becomes possible to produce what it was intended to produce. For this reason it is

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

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

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

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 Heweltt-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.

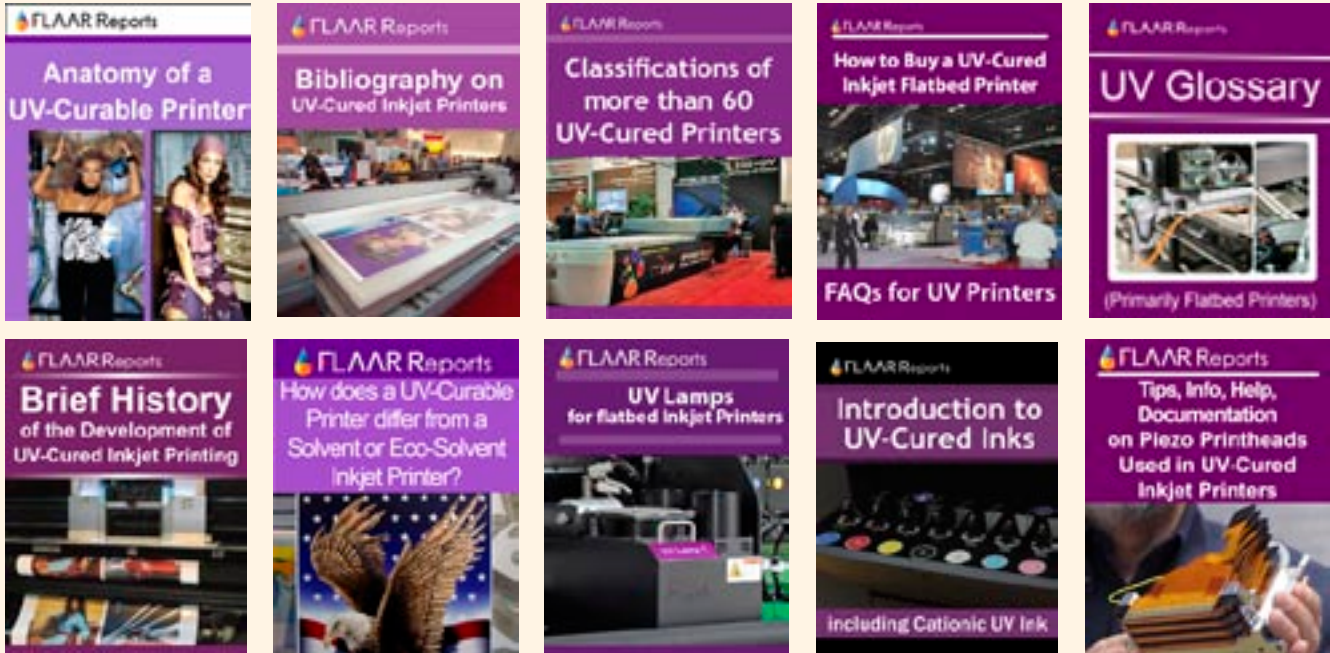FLAAR also serves as consultants to Fortune 500 companies as well as smaller companies and individuals who seek help on which printers to consider when they need digital imaging hardware and software.

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.

These are some of the most
Recent FLAAR Reports (2007-2009)
You can find these and more reports at: www.wide-format-printers.NET

Introduction to UV Curable Inkjet Flatbed Printers

Anatomy of a UV-Curable Printer

Bibliography on UV-Cured Inkjet Printers

Classifications of more than 60 UV-Cured Printers

How to Buy a UV-Cured Inkjet Flatbed Printer — FAQs for UV Printers

UV Glossary (Primarily Flatbed Printers)

Brief History of the Development of UV-Cured Inkjet Printing

How does a UV-Curable Printer differ from a Solvent or Eco-Solvent Inkjet Printer?

UV Lamps for flatbed inkjet Printers

Introduction to UV-Cured Inks including Cationic UV Ink

Tips, Info, Help, Documentation on Piezo Printheads Used in UV-Cured Inkjet Printers

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Roll to Roll UV Printers for Billboards & Banners — Gandinnovations Jeti 3348 UV JetSpeed

Roland LED-UV Curing & Varnish — VersaUV Print&Cut LEC-300

Entry-Level Hybrid UV Roll-to-Roll — LED Curing Mimaki UJV-160

HP Scitex FB6100 — Formerly NUR Tempo UV Flatbed

Flatbed UV Printer — Teckwin TeckStorm