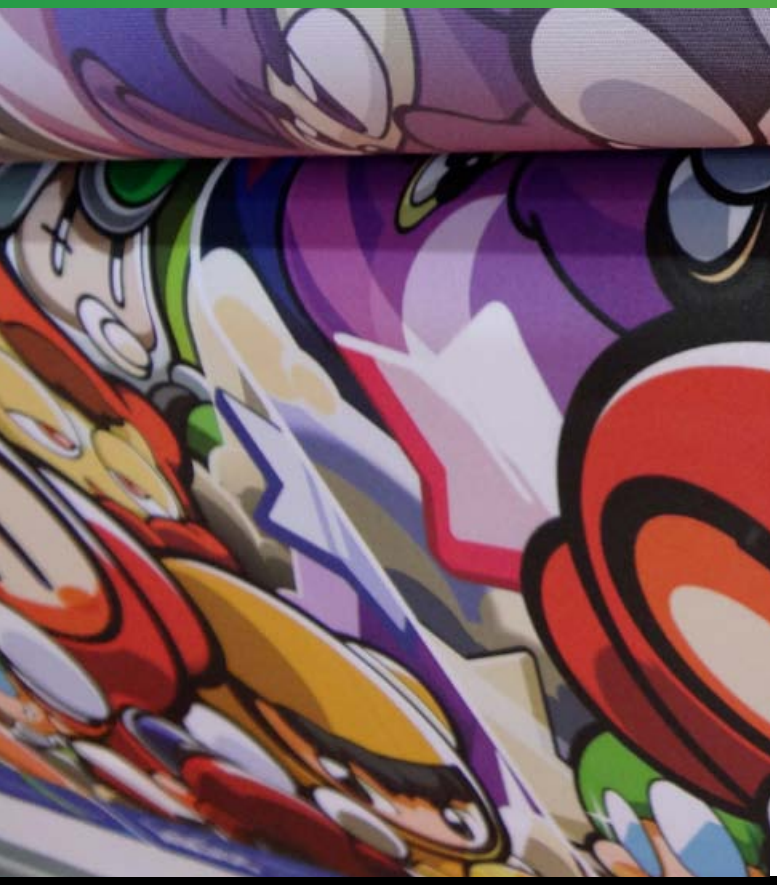
FLAAR Reports

November 2012

# Direct-to-Fabric
## Wide-format Inkjet Printing

# ATPColor DFP RSeries
## Roland Printers with ATPColor sublimation unit

Nicholas Hellmuth and María Renée Ayau



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# ATPColor DFP RSeries

## Direct-to-Fabric Wide-format Inkjet Printing,

### Wide-Format Printer for Textiles Buyer's Guide in FAQs Format:

## Questions to Ask

### During an Evaluation of a Textile and Dye Sublimation Printer

**Ask the following questions before you buy any inkjet printer:**

*Roberto Martellono Managing Director of ATPColor; María Renée Ayau, FLAAR Reports Textile Printers Technical Writer; and Keith Faulkner, President of Splash of Color; at SGIA 2012 trade show.*

## Introduction:

FLAAR has over 15 years of experience evaluating wide-format printers, and has dedicated to evaluate textile printers for several years now. The textile printing market has grown significantly over the past four years. Now more and more companies exhibit textile printers at trade shows around the world. Few companies that exhibit textile printers are manufacturers and dedicated to textile printing. And the majority of companies are heat fixation (sublimation) unit manufacturers that retrofit printers to be used as textile printers, other companies are distributors, and others just claim they "manufacture" the printers that have a chassis, clearly from another printer manufacturer.

This FLAAR report is based in the observation and examination of the ATPColor DFP RSeries printer at different trade shows; and ten years awareness of wide-format inkjet textile printers.

## The Basics

1. Brand name, model?
   *Heatwave DFP RSeries.*

2. What is the nature of the company behind the brand name? Is this company the manufacturer, distributor, or rebranding?
   *ATPColor is the actual manufacturer of the complete sublimation units for their DFP RSeries. This consists of a Roland printer on top and an ATPColor system for handling the fabric. There is a separate FLAAR evaluation of the grand format DFP Series printers.*

3. Does the machine manufacturer also manufacture inks for textiles?
   *No, there are dozens of good ink manufacturers already (not many of whom try to build printers)*

4. Does the machine manufacturer also make textiles to print on with this machine?
   *No, there are scores of manufacturers of media. I am not familiar with any who try to build printers. It really is best to focus and concentrate on doing one thing well: ATPColor focuses on designing textile printers and sublimation systems.*

5. What other printers are the same or similar chassis from this manufacturer or distributor?
   *HeatWave DFP-64, Heatwave DFP-74, and HeatWave DFP-104*

*ATPColor DFP-64 textile printer.*

6. Is this printer mature technology or still in alpha-stage or beta-stage?
*This printer has been in the market for a few years now, so it is in a mature state.*

7. What comes with the printer: stand, network connection already installed, take-up reel?
- *Sublimation Unit*
- *User Manual*
- *Electrical Schematics Manual*
- *Ink trough*
- *Sponge and pad for ink trough*
- *12 weights for dancing roller adjustments.*
- *4 weight stopper*
- *IR lamp to be inserted into the calender, at the two sides of the calender there are the correct screws to be used to fix the lamp. It is important to use these screws and fix the lamp cables very tight.*
- *4 screws to fix the plotter to the sublimation unit*
- *4 cones to hold the media roll, for 2 and 3 inch*

8. What accessories are extra charge? Are these same or similar accessories included with other printers at no extra cost?
*The in-line cutting system is not included.*

9. What other costs are involved?
*Realize that the air filtration system can't use "active carbon." Obviously when you acquire this effective system you will be told what kind of material to utilize.*

10. Does a complete set of full-sized ink cartridges come with the new printer, or merely a "starter set" that is not as full as a regular set?
*You receive two liters per color. I would assess this as a bit more than a starter set.*

11. 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)?
*If your country (like ours, Guatemala) has electricity that is constantly knocked out by monsoon rain storms or severe lightning or earthquakes or volcanic eruptions, you might consider an industrial strength power line conditioner and possibly an Uninterruptible Power Supply (the latter not to run the printer but to be able to turn it off properly if the main power supply in your city is zapped).*

*Otherwise, in most countries, if your local power is acceptable, you do not need to have special electrical equipment.*

12. Do you need a coating machine, steamer, washer, calendering machine?
*No, the calender is embedded, so you can fix the color without using a separate calendering machine. This saves cost, and space, and labor (salary).*

13. Is it recommended, or required, to buy a spare parts kit? Or extra printheads? Does the end-user buy the spare parts kit? Or is this held by the distributor?
*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. There is a "Survival Kit" available but usually this is stocked by the distributor.*

## Purchasing

14. Where are demo centers located?
*The primary demo center is outside Milano, Italy.*

15. What is the procedure to visit a demo center?
*Potential customers are welcome to visit the demo center. It is in a nice area of Italy. Simply meet one of the distributors or the ATPColor Managing Director, Roberto, at a trade show, or send them an e-mail, explaining who you are, your background in the world of wide-format inkjet printers, and the applications you are looking at.*

16. Are end-users welcome to visit the factory and the main headquarters demo center?
*Yes the company is hospitable and potential distributors and potential end-users are welcome to visit.*

17. Are the dealers a national (most companies) or regional (Roland allows a dealer within USA to operate only within a limited regional area)? Do I have any choice in dealers? (with some printers, choosing a dealer is as important as the choice of printer brand; end users repeatedly suggest that choosing a dealer is crucial to the success, or failure, of some brands of printers).
*Most distributors are national. The ATPColor distributor we know the best is Splash of Color. One of many assets of Splash of Color is that they are focused on wide-format textile printers, so they know the workflow, jargon, and can explain the reality of printing on polyester to you.*
- *Germany*
- *Sweden*
- *Norway*
- *UK*
- *USA*
- *Turkey*
- *And obviously Italy.*

18. What kinds of leasing or other financing are available?
*You should obtain leasing from your own financial institution if you need financing.*

*ATPColor headquarters, MIlano Italy.*

## Set-up of the printer: practical considerations

19. What are the electrical requirements of this printer?
*The electrical requirements for this printer are 100-208V, 32 Amps, 3 phase. These power requirements are requested mostly in US, in other countries they may vary.*

20. Are there any special temperature or humidity requirements or preferences of this printing system?
*Temperature and humidity are indeed crucial, especially humidity. Even more important is that whatever temperature and humidity is present in the work area, that it not vary during the day: cool in morning, hot by 11 am. Hotter by 2 pm.*

*While printer is on: the temperature should be between 68-77 °F (20-25 °C) and the humidity 35-80% (no condensation).*
*While printer is off: the temperature should be between 41-104 °F (5-40 °C) and the humidity 20-80% (no condensation).*

21. What is the connectivity? Network, SCSI, FireWire, USB, Ethernet, or other?
*Ethernet (10/100, automatic switching).*

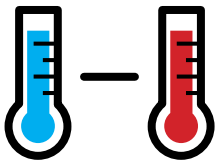
22. What is the size and weight of the printer?
*The printer weights 1598 lbs. (725 kg.).*

23. What is setup of the printer like?
*At least two days is needed.*

24. Realistically, what expenses must you incur for the installation, such as a fork-lift truck or crane to lift the printer off the truck?
*You will need a heavy-duty fork-lift truck.*

**Electrical**

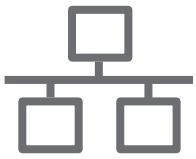
**100-208V**
**32 Amps**
**3 phase**



**Temperature**

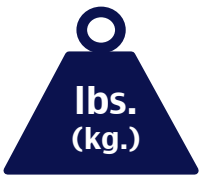
**68 - 77 °F**
**(20 - 25 °C)**

**41 -104 °F**
**(5 - 40 °C)**



**Connectivity**

**Ethernet**
**(10/100)**




**Weight**

**1598 lbs.**
**(725 kg.)**

## Installation of the printer

25. Can you handle the shipping crate with your team, or is a fork-lift required?
*You need a fork-lift truck.*

26. Does the printer come in one piece? Is the printer already put together?
*Yes, already assembled.*

27. Between the day the printer arrives, how soon is it realistic to achieve full productivity?
*This time will depend on how much experience you have with printing with disperse dye ink on polyester. If this is your first machine, two weeks would be expected to acquire full productivity.*

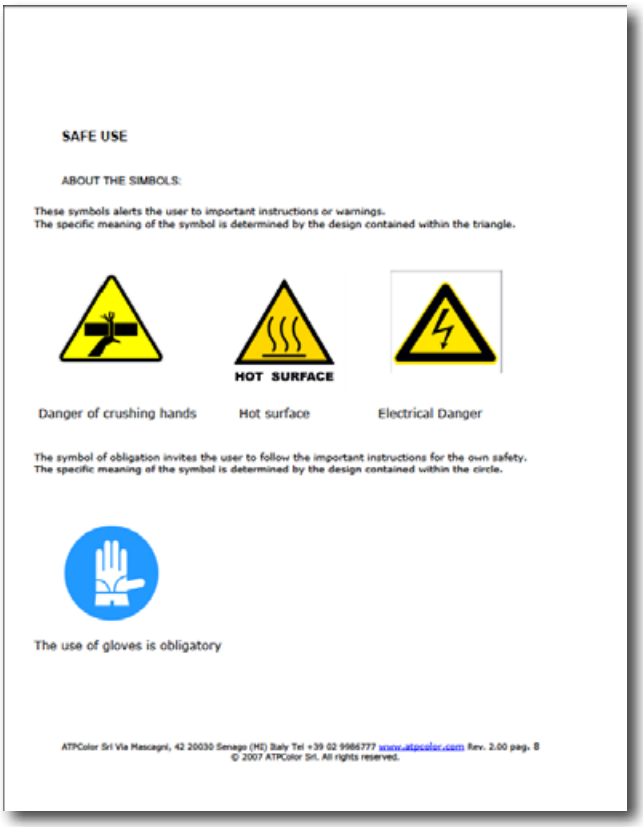
## Installation of the printer: instructions & manuals

28. How many manuals are available?
*Two: the main manual and an electrics schematic manual.*

29. Is there a Site Preparation Guide? If so, is it helpful?
*Yes, there is a site preparation guide.*

30. How difficult is it to obtain the manuals BEFORE you buy the printer?
*If you have an appropriate interest, you can look at the manuals up front.*

31. What is the native language of these guides? Is the translation acceptable?
*The native language of the manuals is Italian and the translation into English is okay; some of the phrases are not perfect idiomatic English, but can still be understood.*


SAFE USE

ABOUT THE SIMBOLS:

These symbols alerts the user to important instructions or warnings.
The specific meaning of the symbol is determined by the design contained within the triangle.

HOT SURFACE

Danger of crushing hands | Hot surface | Electrical Danger

The symbol of obligation invites the user to follow the important instructions for the own safety.
The specific meaning of the symbol is determined by the design contained within the circle.

The use of gloves is obligatory

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32. Does the user's manual have a glossary?
*Most user's guides lack a glossary.*

33. Is there a Service Guide?
*Yes.*

34. Is the Service Guide available to the end-user, or only to the service tech engineer?
*When I visit printshops around the world, some operators have a service manual and others prefer to let the service tech engineer from the distributor or manufacturer take care of this level of service.*

## Installation of the printer: training?

35. Is training included in the purchase price? If so, what kind of training is offered?
*Training price, or inclusion, depends on your local distributor.*

36. Is training necessary? Is classroom training available?
*Training is individual; not in a classroom.*

37. Is factory training available?
*Factory training is rare, though some companies do welcome factory visits, and a few companies do indeed offer training at the factory. And yes, training at the factory outside Milano is available.*

38. What on-line training is available?
*No on-line training; though obviously you can ask questions on-line.*

39. What about follow-up training after you have had the printer a month and know enough to ask better questions?
*At FLAAR our suggestion is to get original training during installation and then make a list of your questions and after the first month get more advanced training. Yes, this follow-up training is available.*

*Maria Renée Ayau, FLAAR technical writer, with Roberto Martellono of ATPColor and Keith Faulkner of President of Splash of Color; during SGIA 2012.*

## Tech support & warranty

40. What is the original warranty period?
*12 months warranty for the printer not including parts, labor, and printheads.*
*36 months warranty for the calendering system.*

41. Does it include parts, labor, printheads?
*Almost all warranty of printheads, any brand, and any printer, are based on what caused the issue with the printheads. If the printhead is at fault; it is normally replaced. If the printhead was damaged by a head strike or lack of cleaning, the manufacturer will tend not to replace it.*

42. What sort of technical assistance do you actually offer? We mean serious technical assistance. Do your tech support people who answer the phone read from a script and only get a real technician later on? Most manufacturers are cutting back on tech support and/or have people answering the phones who do not themselves actually use or know the equipment first-hand. They just attempt to read from a script.
*This depends on the dealer.*

43. What tech support is available and for how long? What is the wait time on the phone… truthfully?
*Depends on the day and hour (and who the dealer is).*

44. Can you provide an extended hardware warranty?
*This can be discussed.*

45. Who provides the service? The dealer or the manufacturer?
*First level would be the dealer. Second level would be directly with the manufacturer.*

46. Do spare parts come from a foreign country? If so, what is the wait time for such parts?
*Some spare parts would come from Europe; other parts from Asia. From our experience there is wait time even for parts for printers from Fortune 500 companies.*

*Manufacturing the sublimation and media feeding units, ATPColor factory.*

## Construction: aesthetics

47. How can you describe the design of the printer?
*The printer is a working machine. So it is not designed to look like a pinball machine. Also it is not painted garish colors: instead it is a nice neutral color (so it does not conflict with your company décor).*

48. Can you easily tell which is the "front" and which is the "back"?
*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 textile 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.*

*So yes, you can easily distinguish the front from the backside of the printer.*

*ATPColor DFP-74 textile printer.*

## Construction: build quality

49. What is the solid-ness of the construction of the outer body? Is it plastic? Metal? Heavy gauge?
*The printer is made out of metal; it looks sturdy.*

50. Is there a front hood and also a back hood?
*There is only a small front window; no back hood is needed on this printer.*

51. Does the front hood lift up high enough to allow full access?
*Yes, the small front hood lifts high enough for a technician to access the interior of the printer.*

52. The front hood, is it strong, or cheap plastic?
*The front window is made of plastic.*

53. Does the printer wobble back and forth when printing?
*No, the printer does not wobble while printing. The construction of the printer is sturdy, thus the printer remains steady while printing.*

54. How many wheels? On printer? How many on fixation unit?
*The printer has 6 wheels in total.*

*Here you can see the small front window and the front wheels.*

## Features: media: heaters

55. How many heaters are used?
*Only one heater is used: the calender.*

56. What is the purpose of the heater(s)? To dry the ink, or to fix the ink?
*The purpose of the heater (calender) is to fix the color onto the fabric.*

57. Are the heaters before printing, during printing or after printing?
*The heater (calender) is used after printing.*

58. If there is more than one heater, can they be operated independently?
*No, there is only one heater.*

59. Do you need to buy a separate additional heater?
*No, you don't need to buy a separate heater. The one on the printer is enough to fix the colors on the textiles.*

*ATPColor heating unit control system 3/4 view: here you can see the touch screen, emergency stop button, power button and reset button.*

## Structure of the printer: media transport mechanism & media path

60. Was this printer made originally as a textile ink printer, or is it retrofitted for textiles? If retrofitted, what was the original brand or model?
*The chassis is from a Roland solvent printer, though the heating unit is specially designed to handle textiles by ATPColor. The printer that it is mostly used in the pictures it is the Roland FP740, this is a "sublimation" printer, not a "solvent" one, other model is a "solvent" printer.*

61. Is there a moving transport belt or a stationary platen?
*The printer has a stationary platen, No transport belt.*

62. Describe the platen.
*A textile printer usually needs a trough. For this printer the trough is cleverly outfitted with a sponge.*

*This is the ATPColor media feeding system, it has a cork roller. You can use the lever to adjust the amount of pressure the cork roller applies to the fabric.*

## Features: media: roll-to-roll feeding

63. How is roll media fed? Pinch roller against grit roller?
*Entry-level and mid-range systems use a row of pinch rollers working against a row of grit rollers. High-end systems use tension. The ATPColor media feeding system uses tension.*

64. How is the roll held at the feeding position? On a spindle? On a saddle?
*The media roll is held at feeding position by a spindle.*

65. How is the roll media handled at feeding position? For example, is there a dancer bar?
*At feeding position, there is a dancer bar to handle the roll media feeding system.*

*At the back, is there an extra roller bar(s) near the platen or transport belt? Is it a bar to roll under the media, or over the media, or are there both (in addition to pinch roller/grit roller arrangement).*
*On the back of the printer there is a foot-feeding pedal to load the media as a single person without the need to jump front & back of the printer. Facing the back of the printer, ink access is at the left; vacuum pipes are at the right.*

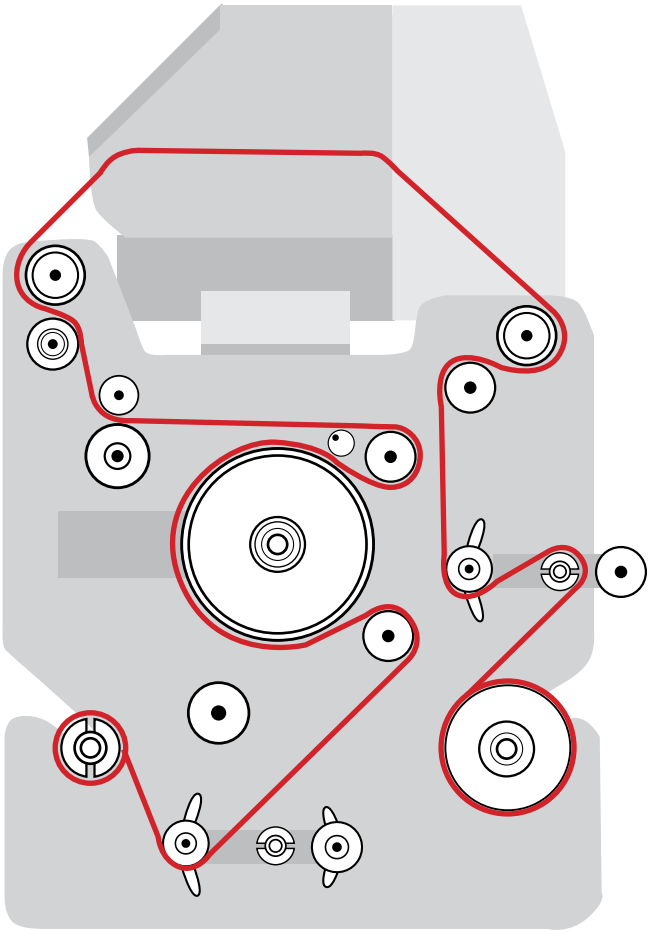
66. At the front, is there an extra roller bar(s) near the platen or transport belt? Is it a bar to roll under the media, or over the media, or are there both (in addition to pinch roller/grit roller arrangement).
*At the front of the printer, there are two bars near the transport belt: one that goes over and one that goes under the media.*

67. Describe the overall path of the media through the system?
*A simple path is neither a major benefit nor a defect. A simple path means that it's easier to load and there is less to go wrong. A more sophisticated system may have advantages for feeding some kinds of media.*

68. Is the take-up spindle an air-core?
*No air-core is needed; uses an "easy block" instead.*

69. Does material roll up evenly on the take-up reel?
*I was frankly surprised to see a printer roll up the media as evenly as this printer does. There was no skew. I am aware that the quality of the media itself affects this. But the fact that this printer does practically a flawless job was one of several hints that ATPColor system is definitely not an average media handling system.*

70. Is there a quick-unwinding function (to get the media off the roll)?
*Yes, ATPColor offers this extra feature (not always found on other printers).*



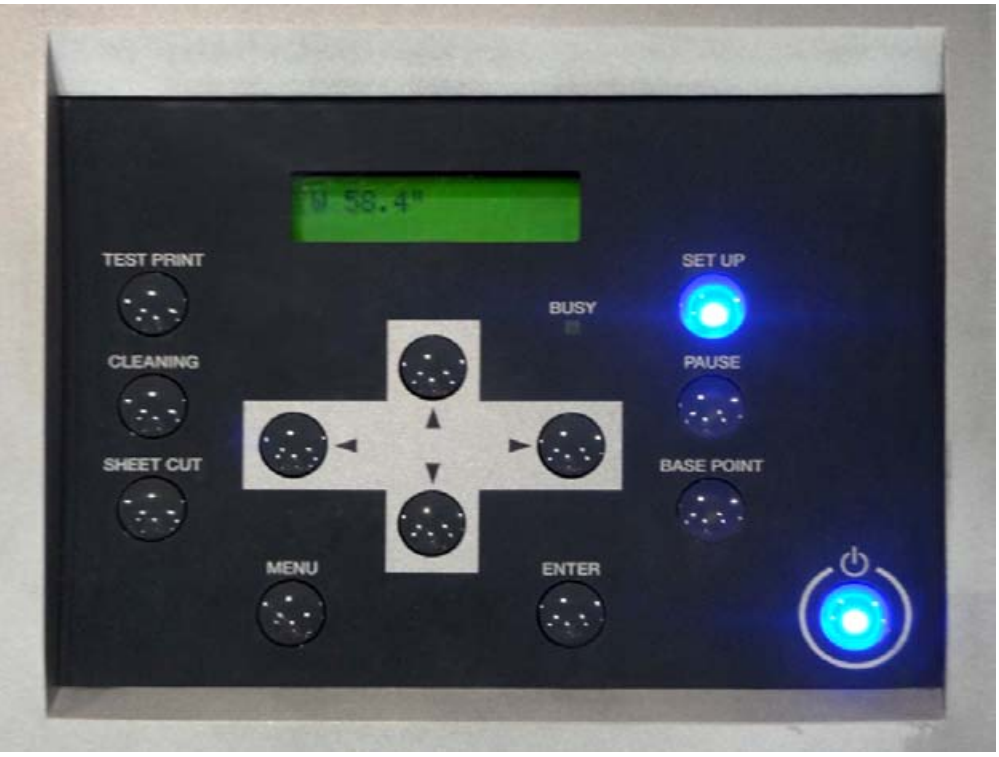
*Media feeding path.*

## Operating the printer

71. Can you manage print jobs via the Internet with your printer?
*No.*

72. Which materials are pre-established in the software, or do you have to create the settings for each class of material yourself?
*Media for display (signage) and media for flags are the two main different kinds of media you would tend to handle with this system.*

73. In the main area for operation, is the machine software based (touch screen), or with physical control buttons? Or Both?
*The printer is software based (touch screen) and also has minimalistic physical control buttons on a tiny touch screen. The touch screen is very small since most controls would be handled through firmware or RIP on your computer monitor.*



*Roland Printer control panel (left) and ATPColor heating unit control panel (right).*

74. Can you operate this printer from your iPad?
*Operating a printer with your iPad started about 18 months ago, and now several brands offer this feature. But this printer is still operated by your normal desktop computer.*

75. How many operators or operator assistants does this printer require?
*One operator is enough to handle this printer.*

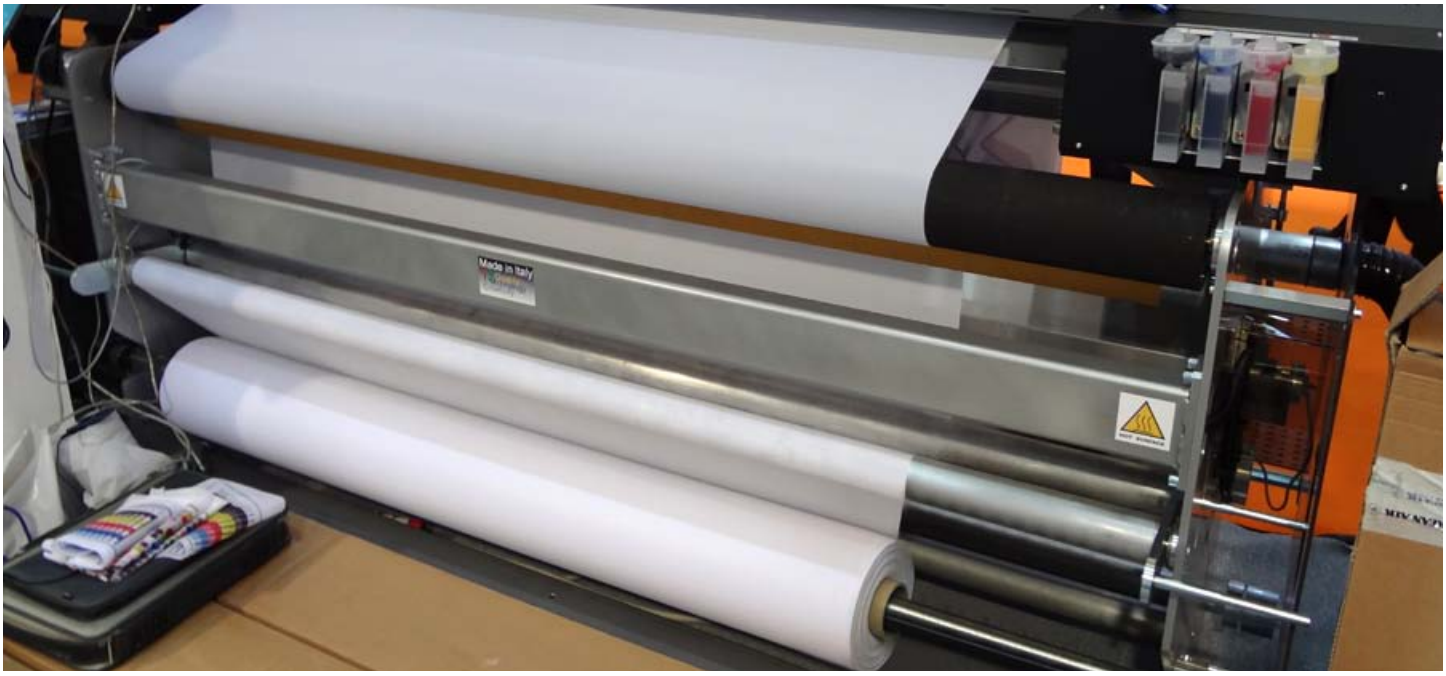
76. What can you control as operator?
    - *ON/OFF line*
    - *Feed calibration*
    - *Total or partial meter counter*
    - *Calender temperature*
    - *Forward/backward buttons*
    - *Set-up screen:*
        - *Supply*
        - *Take-up*
        - *Fault setup*
        - *Calender*
        - *Advance after print*
        - *No heat if no advance*
        - *Security code*
        - *Quick unwinding*
        - *Stop/sub*
    - *Status screen:*
    - *Input*
        - *Foot switch*
        - *Supply down*
        - *Supply up*
        - *Take-up down*
        - *Take-up up*
        - *Fault drive1*
        - *Fault drive2*
        - *Fuse supply*
        - *Fuse take-up*
    - *Output*
        - *Enable calender*
        - *Clockwise supply*
        - *Counter clockwise supply*
        - *Clockwise take-up*
        - *Counter clockwise take-up*

77. Where does the operator stand or sit?
*The operator sits at the RIP station (computer) and otherwise stands at the front of the printer.*

78. What aspects of the printer can you operate from behind (the loading area)?
*The only thing you can operate from the back is loading the media, and filling the bulk ink containers.*

79. What controls are at the back of the printer?
*There are no controls on the outside back of the printer. Facing the back of the printer, ink access is at the right.*

80. What controls are at either end of the printer?
*Air extraction switches are at the right end. The air unit is adjacent at the right.*



*View from the back side of the ATPColor media feeding system.*

## Safety & health considerations

81. Is there auto-shut down? If so, what triggers it?
*No auto-shut down. However the calender will turn off if the printer senses it is overheating.*

82. How much odor is emitted by the ink or heat sublimation process? How much subsequent outgassing is there, and for how long does the stuff smell?
*All sublimation processes result in a cloud of "smoke." This is why the exhaust system is absolutely essential. This extraction of the sublimation smog is taken care of by the exhaust filtration system, which sits adjacent to the printer. The residual odor is normal for what is expected.*

83. Is the machine enclosed, or exposed?
*The printer carriage is enclosed and printing path is exposed.*

84. What system of ventilation or exhaust system is built into the printer? Or if not required, what would common sense dictate? Is it adequate to clear the work area of gasses and fumes?
*The printer comes with a fume box that is connected directly to the printer, so it sucks all the gases and fumes produced during sublimation. Though it is also recommended that you install the printer on a ventilated area, since the ink odor may cause physical distress.*

*There are three manifolds in the air cleaner system, so you can decide yourself how many to turn on.*

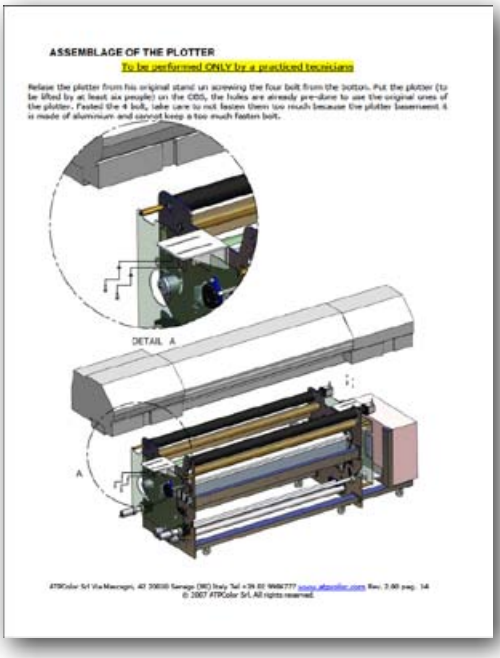
*Fume box conected to the printer.*

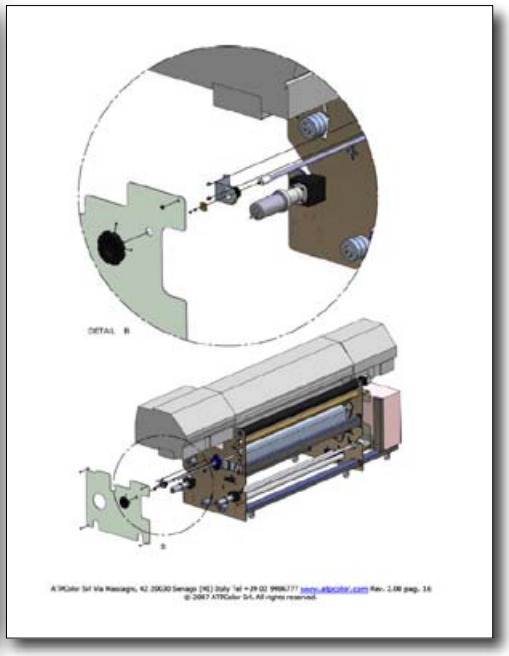
85. What is the noise level, primarily of the fans for the vacuum?
*The fan sounds like you would expect of an industrial fan. Otherwise I did not notice any significant noise made by this printer.*

86. Do the printer specs list the noise level?
*No, it does not list the noise level. In most printers noise comes from vacuum pumps, which are more common in solvent and UV-cured printers.*

87. What moving parts might hit a person if they are standing near the printer?
*None of the parts should hit the person standing nearby, because the printer is enclosed. Except for the printed and fixed media, that are exposed, so the only thing that you could bump into while standing near the printer is the media.*

88. Is the Operator Manual so poorly translated that you might make a mistake; a mistake that could be damaging to your health, or otherwise dangerous for your printshop?
*No, the manual is acceptably translated in idiomatic English, it is not perfect, but it is understandable. This is a huge asset over manuals even from respected Japanese manufacturers. The manuals of one otherwise good brand are poorly done and are rarely in acceptable idiomatic English.*




89. 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.*

*The ink recommended by ATPColor has an MSDS sheet available and also fulfills the requirements of REACH.*

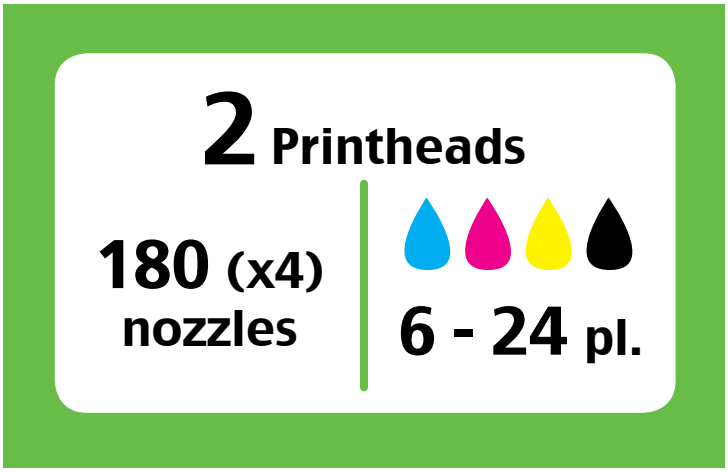
## Printhead technology

90. What is the brand of the printhead, and model?
*The printer uses Epson DX4 printheads.*

91. Is the brand and model of printhead clearly identified in the published specifications?
*No. The published specifications do not list the printhead brand or model.*

92. What other printers use the identical printheads or a model very similar?
*Other textile printers using DX4 printheads are: Mutoh Viper TX, Mutoh Viper soft, Mutoh Viper extreme, and Roland SolJet Pro II V*

## Printhead dpi & features




93. How many printheads are used?
*Two printheads*

94. How many nozzles per printhead?
*180 (x8) active nozzles per printhead.*

95. How many printheads per color?
*Two printheads per color in the DFP-74 model*

96. What is the drop size in picoliters?
*The drop size is 6-24 picoliters.*

97. Which materials really ought to be printed at the uni-directional mode?
*If your media is "dusty" you might test uni-directional printing mode.*

98. 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? 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?
*In the printed specifications the DPI is listed as: maximum 720dpi (for the Heatwave DFP-74) and 1440 dpi (for the DFP-64 and DFP-104 models)*

99. Which materials can be printed fast at 2-pass or 4-pass modes?
*The number of passes needed may also depend on how worn the printheads are. If the printheads are old you may need more passes than when the printheads are new.*

100. Can you vary the material feed rate?
*Yes, you can vary and control the media feed rate.*

101. Can you increase the carriage speed?
*Yes, increasing the carriage speed is one way to affect print quality vs print speed.*

## Printhead life expectancy

102. How long do your printheads really last? Do you have that written in a warranty? If your longevity specs are in drops, please translate that into liters of ink or square footage of media.
*Epson guarantees their heads for about 7 million drops.*

*When I first began evaluating printers (late 1990's), I always had to smile when Epson sales reps tried to claim their heads were permanent. Epson people never admitted their heads eventually wore out from the flushing that most heads require. Although Dimatix Spectra, Konica Minolta, Seiko, Xaar, and Ricoh heads are considered industrial, they cost multiple times more than an Epson head. The noticeably lower cost of an Epson printhead is why most textile printers today use Epson DX4 or DX5 printheads.*

103. If piezo heads fail, who is responsible for paying for replacement heads? If thermal heads, who replaces the heads if they fail before their rated lifespan? What does each printhead cost to replace? Distinguish price for the printhead and also price for the service technician to come and do the installation if it is not user-replaceable?
*If a piezo head fails it is usually considered the fault of the end-user—unless the head is DOA (Dead On Arrival).*

104. How often can you expect head strikes? What causes them? Who will replace the printheads and at whose cost?
*A head strikes is the most common cause of premature head failure (another cause is constant flushing; the flushing seemingly wears out the nozzle system). A single head strike may wipe out only a few nozzles, or may kill the entire printhead. Head strikes may be occasioned by a diverse variety of situations:*
- *Improper loading of the media, which make cause buckling, because the media is caught, or not going through the printer properly.*
- *Thin media can curl, thereby causing a head strike on the curled part*
- *Edge guards, which work on thin materials, may be raised too high.*
- *If media is absorbent, too much ink can make the material bubble up*
- *If media is curled or bubbled by heat; the head can hit the raised part*
- *If media is defective to begin with, or uneven, the head can hit the raised part*
- *If adhesive pulls off the material the adhesive may get stuck on the nozzle plate of the head.*
- *For a textile printer, an additional cause of printhead failure is the fuzz of the threads, which may stick up and rub the nozzle plate.*
- *Some material is like sandpaper to the nozzle plate, some papers, and metal (and the metal edge is another danger to the printhead nozzle plate).*

## Printhead positioning

105. Are printheads at an angle, or in a row?
*The normal position for printheads is parallel to each other in a row. But there are exceptions, and staggered the positions may have other benefits. Each pattern for positioning the printheads has a reason, but most printheads are simply parallel to each other in one row.*

## Cleaning & maintenance

106. How is head cleaning accomplished? Spray, vacuum, suck, manual, other?
*Vacuum and pressure; then wiping.*

107. How many levels (strengths) of printhead cleaning (purging and/or sucking) can be accomplished via the firmware (software)?
*There is one level of vacuum pressure to clean the heads.*

108. Does the manufacturer provide any special cleaning tools?
*Ordinary tools are used.*

109. Is there an off-printer dip-station or soaking station that is separate from the parking or maintenance station?
*Yes, the dealer will tend to have an ultrasonic head cleaning unit.*

110. Does this printer spit, or "weep" at regular intervals?
*Solvent inkjet printers spit ink at the end of every pass in order to keep all printhead nozzles open. The reason is that if you are printing a banner with an area of pure cyan, then the other printheads will not be jetting ink (since their colors are not called for). In theory these nozzles will clog while not being used. So spitting allows all nozzles to eject ink occasionally.*

*Another way to allow all nozzles to squirt ink periodically is to have a band of CMYK or a band of six colors (CMYK light Cyan light Magenta) at one or both edges of the image, immediately outside the image area. This pattern causes every color to jet even if these colors are not being printed in the image itself.*

111. Where does the spit ink go? How do you eventually dispose of the spit ink?
*All excess ink goes into the service station, and then into the bottle below.*

112. What part(s) of this printer need the most attention to avoid breakdown?
*You have to pay attention to keeping the printheads cleaned.*

113. What maintenance issues should be noted?
*Be sure to keep the linear guide clean.*

114. What is the most delicate, or complex, or time-consuming cleaning or maintenance chore?
*Cleaning the calender is a tough assignment. So avoid sticky media or any other act that would tend to leave residue on the surface of the calender.*

115. If you change ink, how much hands-on work is required to set up the ink system? Is hand priming or sucking the ink down the tubes required of the operator? Is head priming automatic, or operator initiated?
*Changing from one ink to another is technically possible in some printers but is rarely recommended.*

116. How much time, media, and ink are used during regular cleaning, calibration, and maintenance?
*Most cleaning aspects are automatic (when you tell the system to clean itself). So regular cleaning takes just a few minutes.*

117. Is there a sleep mode? Should the machine ever be turned completely off? Does this not entail having a UPS unit to guarantee it is on all the time?
*There is a sleep mode. With most (but not all) printers it is advised to leave in sleep mode rather than being turned completely off (which may entail putting solution in the printheads to replace the ink).*

## Cleaning & maintenance: waste

118. To initiate a purge, where is the control or button? Is it software generated or do you have to press a button? Where is the button located?
*Software generated.*

119. Where is the waste bottle situated? How much waste ink does it hold?
*The ink waste bottle can hold up to two liters.*

120. How often do you need to empty the waste ink bottle?
*Frequency of emptying depends on how much you print and how often you purge.*

*Ink waste bottle located below the printer chassis.*

## Printer drivers & software

121. Are the controls mainly manual or are most actions handled in the software?
*Old fashioned printers had most of the controls manually (as switches or buttons) on the printer (front, sides, and back). Nowadays most of the controls for a printer made in a factory which has advanced past the previous generation, the controls are in the firmware and in the RIP software.*

## Rip software: features

122. Is a RIP included in the original price?
*Yes, you get a RIP from Roland: VersaWorks.*

123. If more than one RIP are offered, what are the pros and cons of each RIP?
*The advantage of Roland is price (it comes with the printer).*

## Ink

124. How many different kinds of ink are available?
*Sublimation inks come in several flavors, including oil-based, solvent-based, and water-based. Each kind of ink has some advantages and perhaps one disadvantage. These also depend on whether you are doing direct-to-fabric printing, or printing on transfer paper (since transfer paper also has its several issues).*

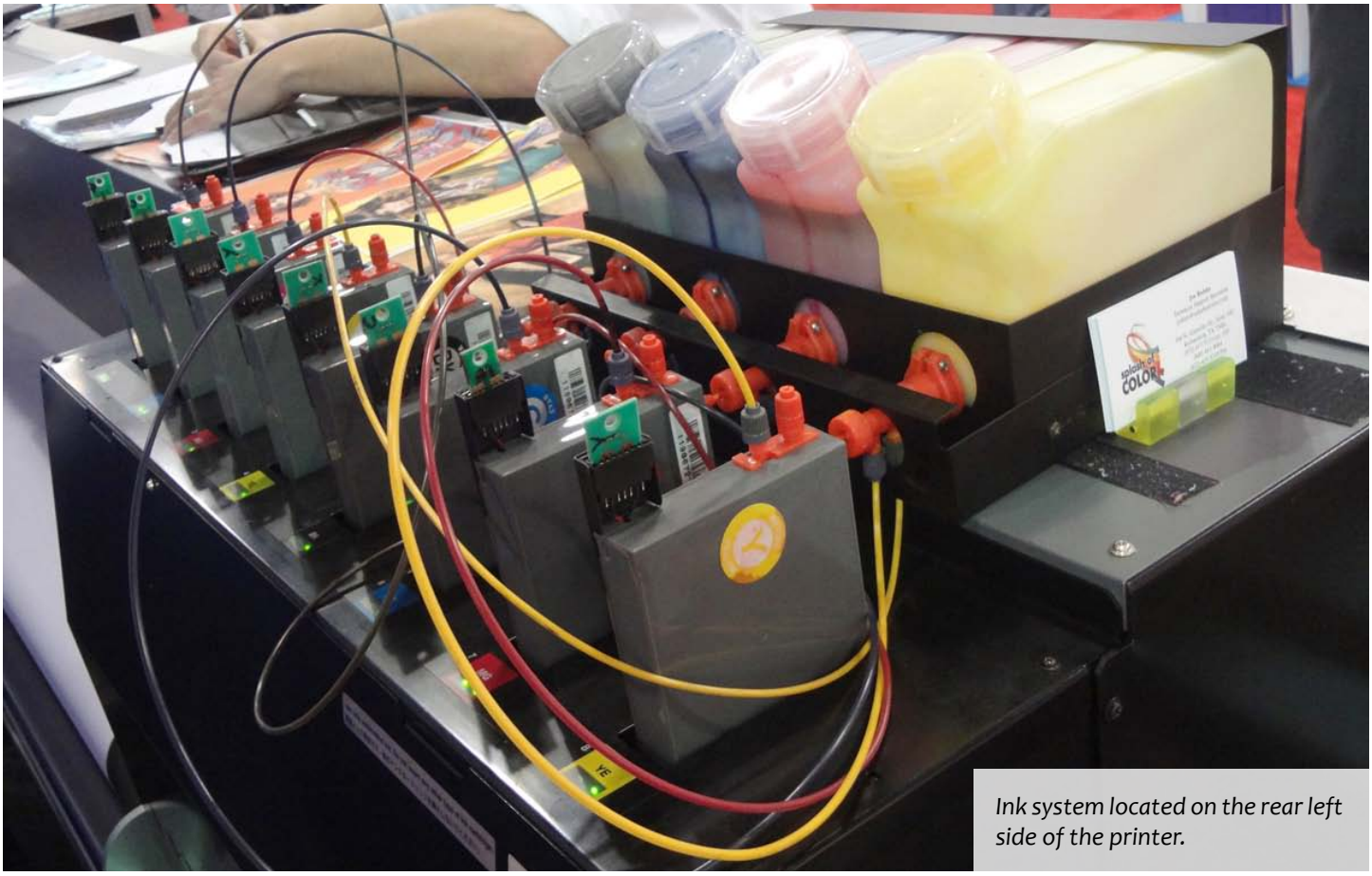
*The ATPColor Rseries uses water based disperse dye ink.*

*You can select two different inks, based on price difference. Both inks are from known name brands (a Swiss company, Sensient is identified in a brochure) and a company headquartered in USA).*

125. If there are several kinds of ink available, can you switch from one to another?
*In theory, yes. You can switch from disperse dye to dye sublimation inks.*

126. How long does it take to switch from one ink to another?
*Two to three hours; you mainly flush a lot of cleaner through the ink lines and printheads.*

127. What company makes the inks? Choices include Kiian, J-Teck, Ciba, DuPont, Sensient, Sericol, Sun, Triangle, Inkwin, and many others.
*Sensient inks, in Switzerland.*



*Ink system located on the rear left side of the printer.*

128. Does the printer itself have a means to keep track of ink usage? Is this a guestimate, or an actual count of droplets fired?
*The RIP software (depending on the brand) would keep track of ink usage. Normally this is a guestimate.*

129. Where are the printer's ink containers located? Front, back, or sides?
*Access is at the top left (when you are at the back, then the right of the back).*

130. What is the ink usage compared with a solvent printer?
*A textile printer tends to use less ink per square meter than a solvent printer.*

131. How much ink does the ink container in the printer hold?
*The ink container can hold 1 liter of ink.*

132. How is new ink added? Pouring into the onboard container? Switching the container to the new ink container?
*By pouring ink into the container.*

133. How can you see the remaining ink level? Do you have to ask to see the ink mode, or is the status available at all times?
*Look at the ink bottle. Also, an InkLow alarm will sound when ink is low.*

*Ink system at the back side of the printer.*

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

*So far we have no report of ink starvation with normal modes on the ATPColor printer.*

135. Is there an ink low alarm?
*Yes.*

136. How often does the filter need to be replaced?
*Depends on how much you print; perhaps once a month.*

## Ink: cost

137. Does ink come in cartridges or bulk? How large are the ink containers for replacement ink?
*Ink tends to come either in bottles (where you pour the ink into the ink container on the printer) or containers that are themselves the ink container: you take the old one out; throw it away; and place the new container in its place. Cartridges tend to only be used in printers with Epson printheads.*

138. What is the cost per container? What is this cost translated to liters?
*Cost of ink varies depending on the dealer/distributor, and depends on what country you are in. Usually the smaller and cheaper the printer, the more the ink costs. The larger the printer is, and the more ink it uses, the lower the ink is priced.*

*ATPColor DFP RSeries uses CMYK ink colors, here you can see the ink system using these colors.*

## Ink: longevity

139. What is the longevity of your dye ink outside in the sun? No lamination, no glass.
*Outside in full sun longevity of most disperse dye ink would be three to four months. Inside an airport, a mall, or other shopping center, longevity is definitely longer.*

140. What effect will high humidity have on your dye inks, on your pigmented inks?
*Evidently high humidity has some advantages over low humidity.*

141. Is the ink of itself waterproof? Or does water resistance happen only on some kinds of media?
*Yes, you can wash the fabric. And obviously, how many times you wash it, and how, will affect longevity of the color.*

142. What about solvents such as cleaning solvents? Do they mar, dull, or wash away the ink or change the surface quality?
*You would need to test each cleaning solvent to know.*

143. What happens if you seal your prints behind glass to protect them? Will the ink outgas and smear the glass?
*Since the calender is set at 200 °C it is expected to sublimate all the ink. Thus to seal your prints behind glass will not automatically engender outgassing. Naturally all this depends on climatic conditions and ink load.*

144. What is the shelf life of the ink?
*Shelf life of the ink depends on storage temperature, plus on how honest the company was that delivered the ink. If the company bought too much ink, and could not sell it fast enough, they might be tempted to back date the shelf life.*

*Shelf life of the ink supplied by ATPColor is one year.*

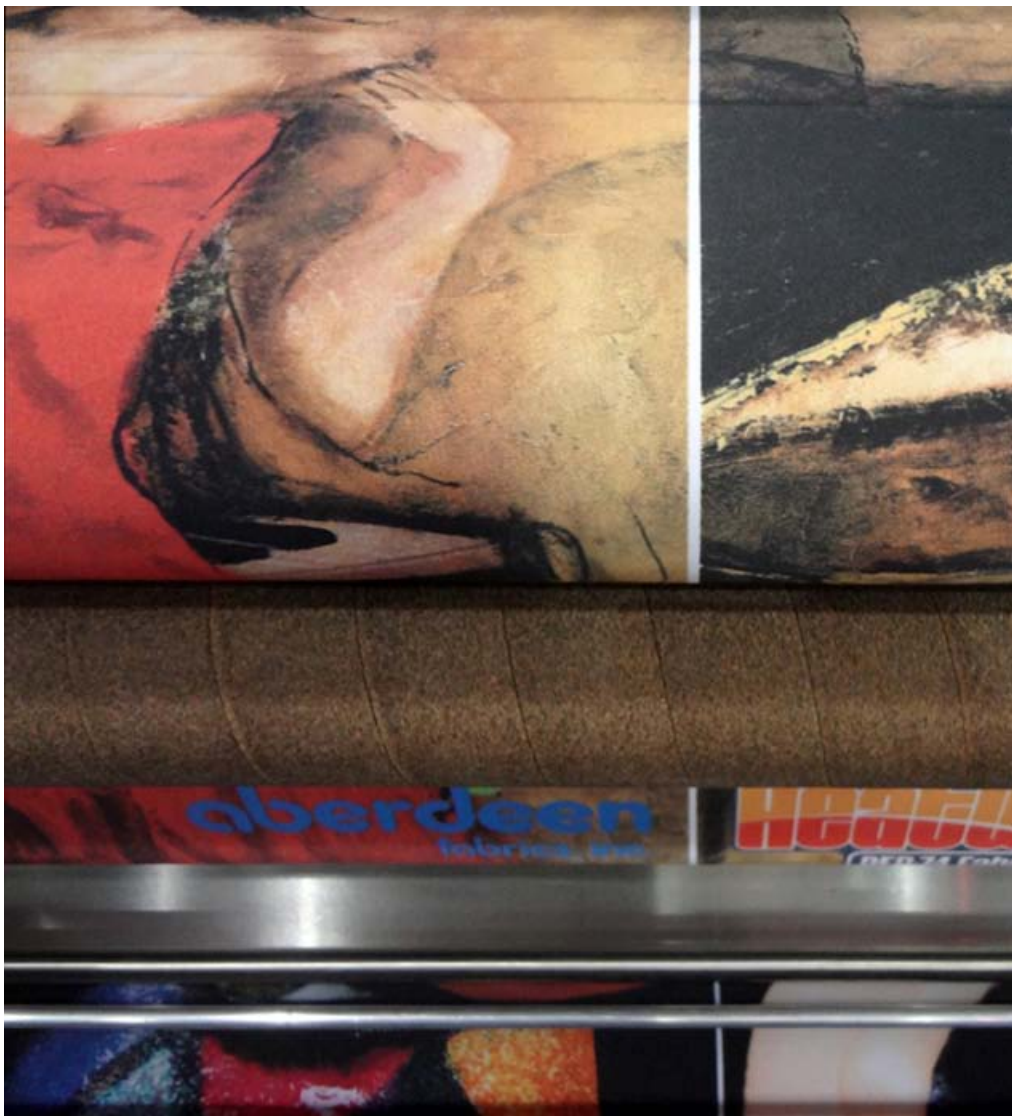
145. Do you have to shake the ink to get the pigments out of being settled?
*No, this is not a pigmented ink (some of which has to be shaken). You do not need to shake dye-based ink.*

146. Does the ink rub off?
*Under normal conditions you would not expect the ink to rub off. Obviously this depends on the chemical situation.*

## Ink: color gamut

147. How many colors are used in the ink-set being evaluated here?
*CMYK.*

148. What colors print best?
*Color gamut will depend on the color of the material on which you are printing, on your experience with color management, and whether you are using canned ICC color profiles or custom profiles that you made yourself.*




*In this printed sample you can see there are no banding lines in the print.*

## Media: Size

149. What widths can be printed?
*HeatWave DFP-64 (1.62 meters), Heatwave DFP-74 (1.83 meters), and HeatWave DFP-104 (2.6 meters).*

150. Is the width enough for target applications?
*Yes, but you can opt for the DFP-104 for wider applications.*

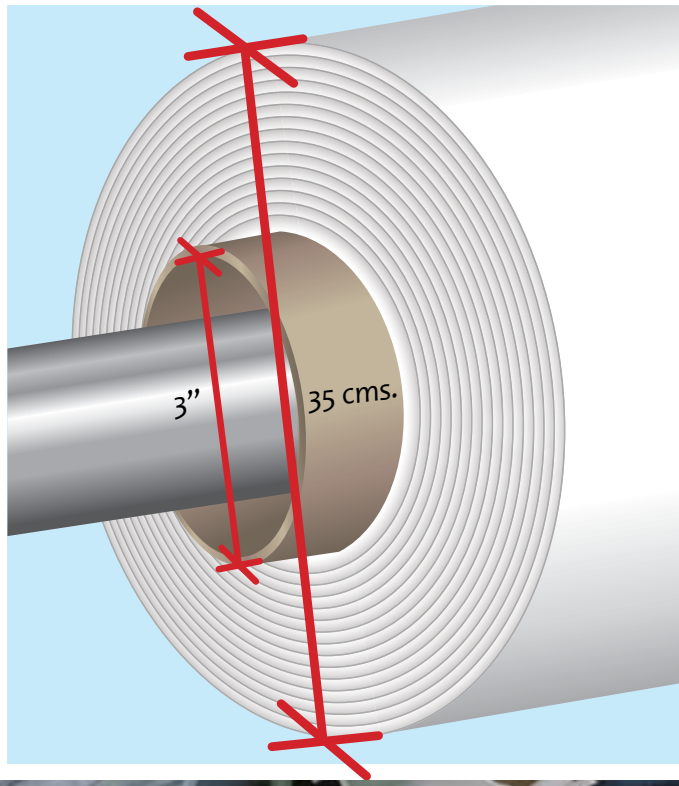
151. What core diameter(s) of media will this printer accept?
*Standard 3".*

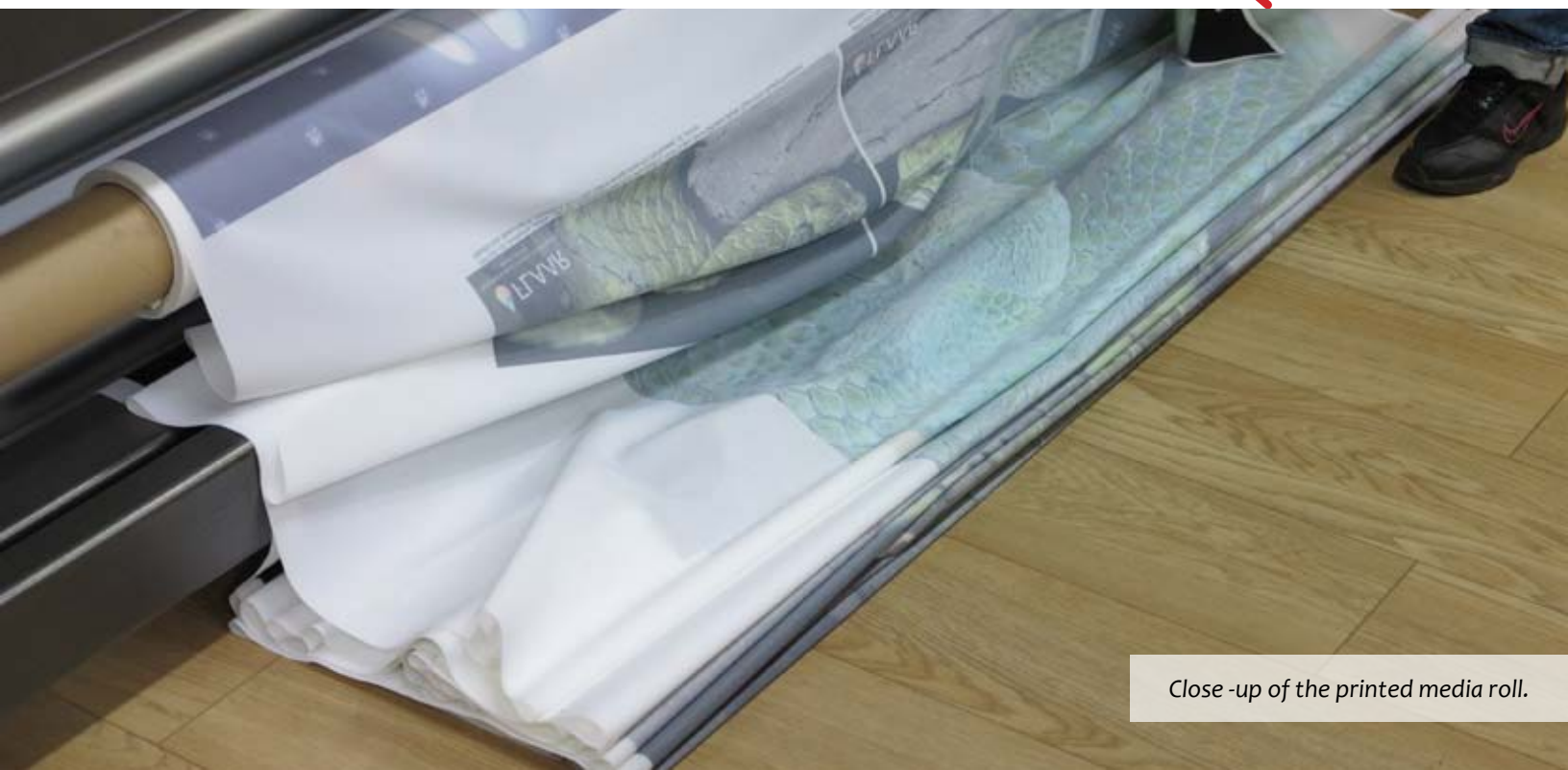
152. Are there core adapters to accept other sized cores?
*Not at present.*

153. What is the maximum roll diameter?
*35 cm normally. If you purchase the optional large-roll system you can take rolls with a diameter up to 66 cm.*

154. What thickness media is accepted?
*Up to 1 mm, but unless you were printing a rug, more thickness would not be needed. And this is not made to be a rug printer.*

155. What length of media tends to be on a roll of material?
*Flag media can be up to 500 meters in length on the roll. Display media can be 200-250 meters long.*



*Close -up of the printed media roll.*

156. Can the printer print edge-to-edge?
*Yes.*

157. Can you manually sheet-feed media? Does it feed easily?
*No, you cannot sheet-feed media.*

158. Can the machine handle two different rolls of media side by side at the same time?
*Yes, the printer can manage two different rolls (it makes more sense in wider printer) but the rolls must have the same diameter.*

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

160. Is printhead height adjustment available? Is it manual, automatic, how much?
*Yes, manual.*

161. Is there a cutter on-board? Is it manual or automatic?
*Yes, the printer has an optional cutting system that uses cold knife technology to make sharp flawless cuts. The In-line cutting system can be stopped or paused without creating defects in the printed fabric*

162. Is there an edge or slot for a hand held X-acto blade or knife to cut printed media off the printer?
*No.*

*From left to right: Keith Faulkner (Splash of Color), Roberto Martellono (ATPColor), Nicholas Hellmuth and Maria Renée Ayau, (FLAAR Reports).*

## Media: what materials

163. Can this printer accept non-coated fabrics?
*Coated polyester or polyester blend is better than non-coated fabrics. But some brands and varieties of non-coated fabric could work for some applications. You would need to try a sample to see. Also heat resistance polyester is required for printing with this printer.*

164. Can this printer accept fabrics with no paper backing?
*No need for a paper backing.*

165. What textiles does the manufacturer list?
*All kinds of normally coated polyester fabrics. It helps if the material is 80% polyester. Disperse dye sublimation transfer paper.*

166. What textiles can this printer print on perfectly?
*Polyester fabrics prepared for digital printing.*

167. What materials can this printer print on successfully?
*Polyester fabric, not stretchable.*

168. What textiles are a problem but can be handled, more or less?
*Fabrics which stretch too much need a sticky belt (conveyor belt system).*

*Printed sample close-up, here you can see the wide color gamut and bright colors achieved by this printer, and the weave of the polyester fabric.*

169. What fabrics are best not to try at all?
*Fabrics without polyester base, as well as fabrics with no heat resistance coating.*

170. What about rugs and comparable thick materials?
*Rugs and comparable thick materials are not an option, since the maximum thickness is 1mm.*

171. Does the printer manufacturer also make coatings?
*No.*

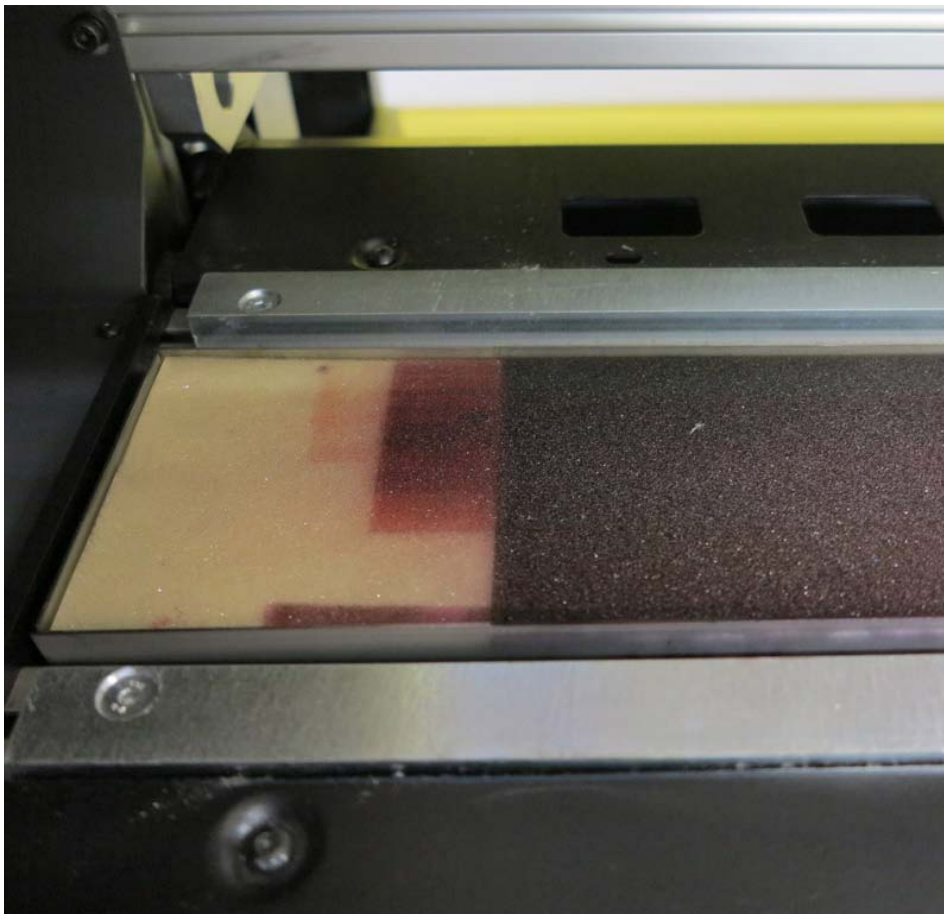
172. Can the manufacturer toll-coat for an end-user who needs a significant amount of one or two coated fabrics?
*ATPColor is a textile printing system developer and manufacturer; not a manufacturer of ink or media.*

173. How much acclimatization time is needed for the media?
*Depends on material (and temperature of storage area compared with temperature of the print room). But usually not an issue.*

174. Is there a trough to catch the ink that goes through the weave of the fabric?
*Yes, there is an ink trough with sponge and pad to absorb any ink that passes through the fabric*

175. How do you clean the trough? Can ink drain down and out of the trough into a waste bottle?
*To clean the trough you pull up the sponge pad and throw it away. And wipe down the edges of the trough. Then cut out and put in a fresh sponge.*

176. How does this printer handle ink that goes through the weave but gets stuck as droplets on the back of the weave? How does it keep these ink drops from getting on the rollers or soiling another part of the fabric when it reaches the wind-up reel?
*There are two issues with printing on fabrics: first, the ink goes through the weave and ends up on the table or transport belt or platen. Second, the fibers from fabrics or mats can get onto the printhead nozzle plate and sometimes up into the nozzles.*



*Close-up of the sponge of the ink trough.*

## Media: issues

177. What about wheel marks or feeding roller path marks?
*You will not get wheel marks or feeding pinch roller path marks because there are no such rollers.*

178. Can the media feed without skew?
*The next time you go to a trade show, look at how the media winds up at the lower back of the printer. Look at the edges of the roll.*

*More than half the rolls have the material sticking out irregularly. Some brands have remarkably sloppy wide-up. Yes, naturally this also depends on the media: cheap low-bid media will tend to wind up a bit more irregularly.*

*But when I looked at the edges of the wind-up roll on the ATPColor machine, it was perfectly flush. So this is one of many reasons why I find that the manufacturer and ATPColor have been successful to spec out a system which functions well.*

*You can see how neatly wound-up is the media roll after being printed.*

## Image quality issues

179. Can a glossy finish be achieved?
*If you use a glossy media the finish will be glossy. If you use a matte media the finish will be matte (so obviously not glossy).*

*Glossy media printed with ATPColor DFP RSeries.*

180. How can banding be avoided?
*More passes tend to get rid of banding on almost any and all inkjet printers. Of course it helps if the machine is precision engineered so you don't get much banding at four passes and above. Banding at two passes is normal. You can eliminate pass-overlap banding by using an interweaving technique (which Mutoh developed and now Roland and others have copied).*

*You can also use a software solution to remove banding. In effect you print in a pattern so that the normal person will simply not notice the banding. This solution is provided within the ATPColor firmware.*

181. How much banding is reported with this particular printhead?
*I have not noticed any banding issues on the samples; which were printed while I observed the machine in action.*

## Fixation unit: calendering system

182. Where is the fixation unit located: physically attached, out in front, separate?
*This calendaring unit is physically attached, in the lower half of the printer.*

183. What are the advantages of having the unit attached to the printer?
*The primary advantage of having the sublimation system attached to the printer is to save space.*

184. What is the brand of fixation unit?
*The brand of the fixation unit is ATPColor.*

185. Where is the fixation unit manufactured?
*The fixation unit is manufactured in Italy.*

186. Does the media wrap the inked side around the calender or the back of the media?
*ATPColor fixation units can be used both with the printed side or the back of the media wrapped around the calendar, depending on the media and ink you are using. Or a third option with a backing wrapped around the calender.*

187. What is the temperature range?
*The temperature range is 20-200 °C.*

*ATPColor DFP-64 textile printer.*

## Applications

190. Does the manufacturer address the overall workflow, or do they just try to sell you the printer and then sort of abandon you?
*If you buy from a generalist inkjet printer dealer you will get the good service for solvent and UV-cured printers.*

*If you buy from a company; which is focused on textiles, which has years background in textile printing, then you can expect to have help on the entire overall workflow.*

191. What are the applications listed by the manufacturer?
*Flags and soft signage are the best applications. But if you are innovative, and if you have clients who are innovative, surely you can create novel applications.*

192. Does the printer allow for perfect registration if printing double-sided?
*In past years some other brands (of solvent printers) offered special (expensive) options for doing registered double-sided printing.*

*But for printing on thin material the color will be visible from both sides anyway. There is no option for registering double-sided printing with most direct-to-fabric printers. The sublimation chemical process is not conducive to this kind of process.*

*Flag printed samples at ATPColor facilities in Milan, Italy.*

## Productivity & ROI (return on investment)

193. Can you sell the output at the machine's fastest output speed or is the quality at that speed not acceptable to most client standards?
*90% of the different brands of printers can't produce usable output at their fastest claimed speed. So I call these speeds "junk mode." It is false advertising in probably half the spec sheets.*

## History and relationships of the manufacturer

194. What is the recent history of the manufacturer?
*Roland is one of the few companies that exhibit in trade shows all over the world, and that have been around for years. They are one of the key companies in the industry.*

*I have seen the owner of ATPColor around the world at pertinent expositions for many many years. He has now expanded beyond wide-format textile printers into the world of serious grand-format production (for signage primarily, though you can use the output any way you desire).*

195. What partners does this manufacturer have?
*The manufacturer has worked with Splash of Color in USA for several years. The manufacturer also has experience with Roland for many years. And in the days of ColorSpan he knew their textile printer inside out.*

*Today he has experience in China. I see him at the key Chinese expos. It is interesting to note who you do see at most expos (the owners of the several really leading textile brands) and who is missing (the owners and managers of the companies that have textile printers in their inventory but that is clearly not their focus).*

*ATPColor logically has the two ink companies as development partners. It is worth noting that the two are both major names in textile inks. Sensient (Switzerland) is listed by name in one brochure. I have been to the headquarters of Sensient ink in Switzerland and can attest to their capabilities.*

*Keith Faulkner and Roberto Martellono.*

## Comparisons with other printers

196. What features on the other printers turn them off?
*The most common issues that I hear about on other printers are inks clogging the printheads, and fumes from inadequate ventilation inside the system.*

*HP works hard to push their latex ink for textiles. But between the issues of cost of the ink, and lack of adequate hand on the resulting textile, most dedicated textile printer companies would not tend to focus on latex ink. Plus latex ink printers are notoriously slow.*

*The best advertising for disperse dye advantages would be a user who has an HP latex ink printer but went and bought a textile printer from ATPColor!*

*And most important, if the company which makes the printer you are considering is simply a miscellaneous printer manufacturer (Epson, HP, etc) and happens to offer you a "textile printer" what chance do you have to speak with individuals who know textile printing in the real world?*

197. What aspects of the selected printer help decide in its favor?
*For my own judgment, as I have stated before, I prefer a textile printer made by a textile-oriented company.*

*I do not tend to find a textile printer from a UV-cured manufacturer or solvent ink printer manufacturer as the best option. In some cases, if your solvent or UV-cured dealer is great to work with, I can understand why a printshop would opt for a textile printer via a solvent or UV-cured manufacturer. But so far, printers for textiles made by the biggest names in UV-cured printers have not always been totally successful: they are okay (every printer is good for many things no matter what). But now that I have fifteen years experience evaluating printers, and now that I have several years specifically evaluating grand-format textile printers, I increasingly would tend to opt for a textile printer primarily from a textile-focused source.*

## Advertising claims: realistic, exaggerated, or misleading?

198. What kinds of printed brochures are available?
*There is a two page brochure on the DFP Rseries, plus a folding cover.*

199. What do these ads claim?
*The only statement that I would want to ask about is relative to UV-resistance, as dye ink in general is not intended for outside. If you were not aware of this in advance, you might mistakenly think that disperse dye inks can hold up to sun. This is in the enclosure, not in the actual brochure.*

*But I would estimate that some inks can potentially hold up longer than other inks.*

*ATPColor DFP RSeries brochures by Splash of Color.*

## General considerations

200. Is there a User's Group specifically for this printer?
*There is no user's group.*

201. What will the resale value of your printer be in three to five years? Will either the brand name or model specifications cause a knowing buyer three years from now to shy away from your printer or cause a knowing buyer to only want to pay a very low price as compared to the other printers our company is considering? A company that is no longer in business may cause printers of that brand to lose value in the used market. Or is there some major technological breakthrough in your brand that will result in less value for your current model?

*ATPColor has been in business for many years. The owner is dedicated to his business. I do not expect this company to evaporate.*

*Most printers from Chinese manufacturers have a low resale value in part because they constantly change their features, so in four years the features of your printer will no longer have spare parts available. But a European company is required to keep spare parts for several years. Plus, this is not really a "Chinese printer;" this is a combination of Chinese experience in manufacturing combined with the experience of ATPColor with textile printing.*

*FLAAR staff in Splash of Color booth during SGIA 2012, ATPColor DFP-74 textile printer in the back.*

# Final Comments

## Pros for the printer portion

The printer chassis is manufactured by Roland; a company that has been in the market for years. Although they don't manufacture textile printers per se, Roland is one of the preferred brands used for assembling textile printers by other companies, especially ones that sell heat fixation units.

The Roland printer and ATPColor unit combination is a very sturdy printing solution that does not wobble while printing, unlike many entry-level textile printers.

## Pros for the heat fixation (sublimation) unit

The newest models allow you to heat the front or back of the inked media. Flag media is best sublimated with the front against the calender. Display media is best sublimated with the back against the calender.

You can also sublimate against the front with protective paper on. Not many (and in some cases not any) other printers offer these options.

The original models can receive an upgrade kit so you can switch between sublimating the front or back. Otherwise this should be configured in the factory.

## Pros for the media handling system

The media is feed from the back of the printer, and has a system so that one person alone can do this job without having to go from the back to the front of the printer.

The media handling system has a level that allows you to graduate the applied pressure to the fabric, by simply joining or separating the rolls that handle the media.

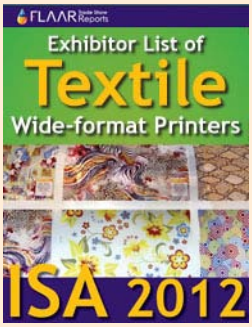
After the media is printed and fixed it is neatly wound-up, which is very rare in entry level printers, since they usually have an entry level media handling system, opposed to the professional one from ATPColor.

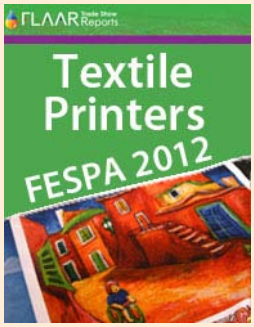
## Downsides

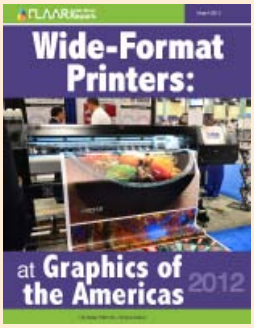
We are still working on ascertaining downsides of this system. An obvious reality check is that most dye-sublimation printers today can only print well on polyester fabric. As soon as we can find an issue, weakness, missing feature, we will update this report.

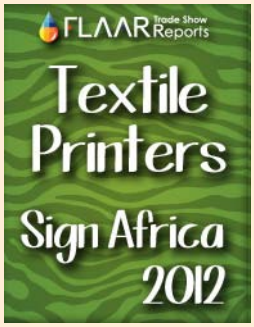
One I would mention already is be sure to consider a RIP software which is developed for printing on fabrics.

## Textile Printer Reports from 2012





## Introductory Textile Printer Reports

**This report is not licensed to be distributed by any printer manufacturer on their own web site.**

**This report is not licensed to be distributed by any dealer or distributor on their own web site.**

**These may be pirated copies, or may be earlier versions. We may have learned more about the printer and updated our report (but the manufacturer, distributor, or dealer may not have the most recent information from our evaluation).**

## 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 printshop site-visit case studies, and comments from the more than 53,000 of our many readers who have shared their experiences with us via e-mail (the Survey Forms).

## Licensing Information

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

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

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

## Licensing Information

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. Often we update the web page on a printer rather than the PDF version. So be sure to check the web page if you have a PDF of any year prior to 2011.

FLAAR still publishes individual reports on solvent printers, and on giclee printers, but we tend to write about new technologies and innovative inks.

## Please Note

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

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

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

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

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

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

## Citing and Crediting

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

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

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

www.FLAAR.org." If the quote is more than a few words then academic tradition would expect that a footnote or entry in your bibliography would reference the complete title. Publisher would be www.large-format-printers.org (or other appropriate site in the FLAAR network).

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

## Legal notice

Inclusion in this study by itself in no way endorses any printer, media, ink, RIP or other digital imaging hardware or software. Equally, exclusion from this study is not intended to discredit any printer, ink, media, or product.

A printer may change components since we first reviewed it. A component may be defective in the specific machine you buy (which is obviously not the specific machine we evaluated). And in some factories they may have forgotten to screw a particular part in correctly. So that component may break or wear out, and cause downtime (or injury to the printer operator). There is no realistic way even an evaluation can offer protection from such normal issues with one manufacturing run.

## Advisory

We do our best to obtain information which we consider reliable. But with hundreds of makes and models of printers, dozens of kinds of ink, 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 a trustworthy end-user of the same make and model you need to know about. If you are thinking of an after-market ink, be sure you speak with another printer operator to find out how this ink has worked for them.

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. It is not realistic to update all the old reports, so if the report was written before 2011, it is all the more essential to check with end-users. And for inks and media, one chemical could be off in one batch. There is no way to keep track of every manufacturing run of each ink. Even major Japanese corporations have an occasional bad run of ink, or a bad series of printers. While on the subject of ink, realize that even OEM ink factories occasionally have a bad batch of ink. What counts is that when this happens that the ink company apologizes and replaces the ink if this is appropriate. It is not realistic for us to keep track of every batch of each ink company: some ink companies make dozens or even hundreds of different inks every month. What we do keep track of, however, is the long term track record of a company.

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 waste our time learning about a 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 in a factory or distributor demo room, may subsequently turn out to be a lemon under real-world conditions out in a printshop.

Plus, whether or not the end-user is trained to properly utilize the product effects whether the product works acceptably, or not. So the end-user we inspect may later learned to be atypical due to being really well trained, or have inadequate training.

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

Equally often, what at first might be blamed on a bad product, often turns out to be a need of more operator experience and training. More often than not, after learning more about the product it becomes possible to produce what it was intended to produce. For this reason it is crucial for the FLAAR team 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 and the outpouring of new textile printers. We observe as best we can, but we cannot take each printer apart to inspect each feature. And for UV printers, these are too expensive to move into our own facilities for long-range testing, so we do as best as is possible under the circumstances. And when a deficiency does become apparent, usually from word-of-mouth or from an end-user, it may take time to get this written up and issued in a new release.

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

For these reasons, every FLAAR Report tries to have its publication date on the front outside cover (if we updated everything instantly the cost would be at commercial rates and it would not be possible to cover these expenses). At the end of most FLAAR Reports there is additionally a list of how many times that report has been updated. A report with lots of updates means that we are updating that subject based on availability of new information. If there is no update that is a pretty good indication that report has not been updated! With 101 models of UV printers, several hundred solvent printers, and scores of water-based printers, we tend to give priority to getting new reports out on printers about which not much info at all is available elsewhere. So we are

pretty good about reporting on advances in LED curing. But glitches in a common water-based printer will take longer to work its way through our system into an update, especially if the glitch occurs only in certain circumstances, for example, on one type of media. With several hundred media types, we may not yet have utilized the problem media. While on the subject of doing your own research, be sure to ask both the printer operator and printshop owner or manager: you will generally get two slightly different stories. A printer operator may be aware of more glitches of the printer than the owner.

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

But even when we like a product and recommend it, we still can't guarantee or certify any make or model nor its profitability in use because we don't know the conditions under which a printer system might be utilized in someone else's facility. For ink and media, especially aftermarket 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.

It is also crucial to realize that an ink (that we inspect, that works well where we inspect it), your printer, your printhead, the heat, humidity and dust conditions in your printshop, may cause that ink to react differently in your printer. And, there are different batches of ink. Even in the really big multi-national billion-dollar ink companies, occasionally one batch will have issues. There are over 100 ink companies; six colors per company, many flavors of ink per company per color. We have no realistic manner of testing each ink.

The same is true of media and substrates. One production run can have a glitch: chemical or physical, even in the best of companies. About six years ago, a major Swiss-owned media company, for example, had several months of media which were almost unusable (turned out they were rebranding media from China). Yet other kinds of media from the same company are okay (though we stopped using that brand and stopped recommending them after all the issues we ourselves experienced).

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

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

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

## Results you see at trade shows may not be realistic

Be aware that trade show results may not be realistic. Trade shows are idealized situations, with full-time tech support to keep things running. The images at a trade show may be tweaked. Other images 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.

## Results you see in a manufacturers or master distributors demo room may not be realistic

We are learning that what you see in a demo room may not be what performance you will receive in your own printshop. The temperature, humidity, and air quality in your city may be totally different than the skillfully controlled conditions in a demo room.

And, many printers look great when they are new and in a demo room. But once the ink has been flowing through the ink delivery system and printheads for several months, you may experience issues that were not observable in the demo room. In other words, a report based on demo room observations is a first step. YOU still need to check with end-users to learn the difference between performance in the demo room and performance out in the real world.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## Availability of spare parts may be a significant issue

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

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

## Lack of Tech Support Personnel is increasing

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

## When a distributor drops distribution, you may get no more tech support!

If your distributor has issues with the manufacturer, you may be abandoned if that distributor drops the product.

If another distributor takes up that product, they may not provide you tech support because you did not buy the printer from them.

## Occasionally even the manufacturer goes bankrupt!

Even major Swiss printer manufacturers have had issues and gone out of business (for their wide-format printers). THREE Swiss manufacturers are in this list actually. There are also companies in Canada, USA, and Europe which had corporate meltdown: Gandinnovations is the best example but there are many others. Neolt recently went into reognization (July 2012) (a polite way of saying downsizing after filing a court case which would be roughly comparable to Chapter 11 in the USA). Most companies studiously avoid using the word "pleading bankruptcy" but to a lay person it's very close to the same.

In some cases the company continues (Neolt we hope is in this category).

Or sometimes a manufacturer simply runs out of money. They avoid publically announcing this but the effect is similar to Chapter 11 or banktuptcy: downsizing, and technical support may drop. Plus you may not get much innovation from a company which can't afford to pay its bills.

## Any printer may take a few months to break in

Any new printer, no matter who the manufacturer, or how good is the engineering and electronics, will tend to have teething issues. Until the firmware is updated, you may be a beta tester. This does not mean the printer should be avoided, just realize that you may have some downtime and a few headaches. Of course the worst case scenario for this was the half-million dollar Lüscher 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. So when we mention a brand name, this is a brand name; this is not a guarantee the part is not counterfeited.

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

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

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

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

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

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

## Be sure to check all FLAAR resources

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

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


## Acknowledgements

With 15 employees the funding has to come from somewhere, so we do welcome project sponsorship, research grants, contributions that facilitate our educational programs, scholarships for co-op interns and graduate students, and comparable project-oriented funding from manufacturers. The benefit for the end-user is a principle called academic freedom, in this case,

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

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

Besides, it does not take any money to see which printers and RIPs function as advertised and which don't. We saw one hyped printer grind to a halt, malfunction, or otherwise publicly display its 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 ATP-Color, Sun LLC, (EFI Rastek, EFI VUTEk, Drytac, DigiFab, Seiko II, Hongsam ink, InkWin ink and Dilli 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 2012-2013), 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 the factory and headquarters demo room. Since the university does not fund any of these trips, it is traditional for the manufacturer to fund a research sponsorship. In the US this is how most university projects are initiated for decades now, and it is increasing. In fact there is a university in Austria that is not an "edu" but is a "GmbH", funded by the chamber of commerce of that part of Austria. In other words, a university as an educational institution, but functioning in the real world as an actual business. This is a sensible model, especially when FLAAR staff need to be on the road over a quarter of a million miles per year (roughly over 400,000 km per year total for the staff). Obviously this travel is hosted since unless money falls from heaven there most realistic way to obtain funding to get to the demo rooms for training is direct from the source.

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

Barbieri electronic (color management), Caldera (RIP), ColorSpan, DEC, Durst, EFI, EskoArtwork, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Obeikan, Dilli, Drytac, JETRIX, GCC, NUR, Oce, Shiraz (RIP), Sky Air-Ship, Sun, Teckwin, VUTEk, WP Digital, Polytype, Xerox, Yuhan-Kimberly, MTEX, Decal, DigiDelta, Zünd have each brought FLAAR staff to their headquarters and printer factories. Sepiax, AT Inks, Bordeaux, InkWin, Sepiax, Sam-Ink, Jetbest, Hongsam, InkTec, and Sunflower ink have brought us to inspect their ink manufacturing facilities and demo rooms. Notice that we interact with a wide range of companies: it is more helpful to our readers when we interact with many different companies rather than just one. However each ink company makes many products and merely because we have been to their factory does not automatically mean that we recommend their inks. It is important that we also visit end-users, and this has not been possible with Bordeaux or Sunflower inks.

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

Contributions, grant, sponsorships, and project funds from these companies are also used to improve the design and appearance of the web sites of the FLAAR Information Network. We thank Canon, ColorSpan, HP, ITNH, and Mimaki for providing wide format printers, inks, and media to the universities where FLAAR does research on wide format digital imaging. We thank Epson America for providing an Epson 7500 printer many years ago, and Parrot Digigraphic for providing 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), Parrot Digigraphic and Cruse, both in Germany, have kindly provided scanners for our staff to evaluate.

We really liked some of the results whereas some of the other products were a bit disappointing. Providing samples does not influence the evaluations because the evaluators are students, professors, and staff of Bowling Green State University. These personnel are not hired by any inkjet printer company; they were universities employees (as was also true for Nicholas Hellmuth). The testing person for the HP ColorPro (desktop printer) said he frankly preferred his Epson printer. When we saw the rest results we did not include this Hewlett-Packard ColorPro printer on our list of recommended printers, but we love our HP DesignJet 5000ps so much we now have two of them, one at each university.

Sometimes we hear horror stories about a printer. The only way we can tell whether this is the fault of the printer design, or lack of training of the operator, is to have the printer ourselves in-house. Of course some printer manufacturers don't understand the reasons we need to have each make and model; they are used to loaning their demo units for a week or so. That is obviously inadequate for a serious review.

Some of the media provided to us failed miserably. Three printers failed to meet common sense usability and printability standards as well (HP 1055, one older desktop model (HP Color Pro GA), and one Epson). Yet we know other users who had better results; maybe ours came down the assembly line on a Monday or Friday afternoon, when workers were not attentive. One costly color management software package was judged "incapable" by two reviewers (one from the university; second was an outside user who had made the mistake of buying this package).

So it's obvious that providing products or even a grant is no shield from having your products fail a FLAAR evaluation. The reason is clear: the end user is our judge. The entire FLAAR service program is to assist the people who need to use digital imaging hardware and software. If a product functions we find out and promulgate the good news. If a product is a failure, or more likely, needs some improvement in the next generation, we let people know. If a product is hyped by what an informed user would recognize as potentially false and misleading nonsense, then we point out the pathetic discrepancies very clearly.

This is what you should expect from an institute which is headed by a professor.

Actually, most of our reviews are based on comments by end users. We use their tips to check out pros and cons of virtually every product we discuss. You can't fool a print shop owner whose printer simply fails to function as advertised. And equally, a sign shop owner who earns a million dollars a year from a single printer brand makes an impact on us as well. We have multiple owners of ColorSpan printers tell us that this printer is their real money earner for example. We know other print shops where their primarily income is from Encad printers. Kinkos has settled on the HP 5000 as its main moneymaker 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 12 years of experience. An evaluation of a printer, an ink, media, substrate, 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