Hybrid UV: flatbed plus roll-to-roll capability:

Legend 72HUV

Content

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Introduction

Franchise printshops, family owned sign shops, digital printing companies, screen printing companies and everyone who previously was doing primarily offset printing, lithography, etc, are now realizing they need to move to UV-cured wide-format inkjet printing to survive as printing companies.

Because solvent printers cost between $15,000 and $35,000 for entry level, it is a step-up for printshop owners to move into UV printing when these cost between $65,000 and $130,000 for entry level (mid-range UV printers such as IP&I, Dilli, GCC are $150,000-$200,000; high end UV printers such as Durst, Gandinnovations, Screen, and other brands are $300,000 to $600,000).

In the beginning, the first entry-level UV printer was the Zund 215. It sold over 300 units at prices from $120,000 to perhaps $150,00. This brand was replaced as #1 by the ColorSpan 72UVR, UVX, and 98UVX (over 900 of these were sold). Gerber Solara sold a few hundred of their entry level hybrid machine before it became obsolete. All together about two thousand entry-level UV printers were sold between 2001 and 2008.

Today at least half of these need to be replaced because both clients and printshop owners expect a better machine nowadays. Plus, in addition to replacement UV printers, there are thousand more printshop owners who will start with their first UV printer in 2008 and 2009. All of this potential is why several manufacturers and distributors are working to satisfy the need for entry level printers (which can be informally described as a UV-curable printer priced under $90,000).

So far most UV printers priced at under $60,000 have not functioned adequately: the Oce Arizona 60UV and several cheap entry-level Chinese UV printers are in this inadequate category. You simply can't build (and provide tech support) for a UV curing ink chemistry at such cheap prices. So the better entry-level printers are in the $65,000 to $85,000 range.

LexJet Legend 72HUV printer at LexJet demo center, Sarasota, Florida.

The report in the present PDF is a first step towards a long-range evaluation of an entry-level printer which has a good track record so far. In other words, the owners of this printer so far appear to be content. Our next step forward after this initial report will be to verify how the Legend 72HUV is doing in printshops that are using it in the real world. This will happen as soon as time is available and access is arranged.

In the meantime I kept my eyes and ears open for viable entry level UV printers. It was possible to have access to the Legend 72HUV for two days at their main demo center in Sarasota, Florida during the week after DRUPA 2008, so here are my observations and conclusions.

THE BASICS

1. Brand name, model?
Legend 72HUV

2. What is the nature of the company? Is this company the manufacturer, distributor, or rebranding a machine made by someone else?
The manufacturer is Shenzhen Runjiang Advertising Equipment & Material Co. Ltd, also called ShenZhen Runtianzhi Image Technology Co., Ltd. Sometimes abbreviated RTZ. Their own house brand name is Flora.

Digital Equipment Company (DEC) is the importer. Sales are handled by LexJet, Lloyds and also by a distribution network that is being expanded. LexJet is a separate company owned by the same people own DEC and who also own several other companies. LexJet is one of the most successful inkjet media sales companies in the US. LexJet is also a leader in computerized data banks for a knowledge base on whatever areas it gets into (in this present case, into UV-curable printers).

3. Is this same model(s) rebranded and sold under other names?
An earlier version of this printer was exhibited at trade shows as the DuPont Cromaprint 18UV.

John Crumbaugh (left), is the vice president of Technology department at Digital Equipment Company. Russel T. Brown (right), vice president of Operations & Engineering at the same company.

4. What other printers of other brands are comparable?

Most other hybrid style UV printers are either slower (the Gerber Solara), are more rudimentary (90% of the Chinese-made UV printers at the recent Shanghai show, which are only prototypes, not real production models). So the Legend 72HUV is in a league above most competitors.

5. When and where was this model first introduced?

Although the Legend 72HUV was not really officially launched at any trade show, LexJet and Digital Equipment Company (DEC) began marketing this printer in January 2008.

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

This is a mature printer.

LexJet Legend 72H UV

7. List price?

$79,995

8. 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?

The printer comes with training, installation
  • PC
  • monitor
  • 1 roll of material
  • 4 liters of flush liquid
  • 2 liters of each color of ink

9. What other equipment is needed to operate this printer? For example, does this printer include its own power line conditioner?

  • Piping from printer to air scrubber.
  • Air scrubber

10. Do you need an uninterruptible power supply (UPS)?

Not required unless you are in an area with frequent power outages (such as Guatemala City during the monsoon rainy season).

11. Is it recommended, or required, to buy a spare parts kit? Or extra printheads?
The printer comes with a kit of spare parts which includes.
  • Wiper for printheads
  • Scrapper for drip tray
  • Replacement capper
  • Pair of UV lamps
  • Spare ink pump
  • Spare flush pump
  • Ink level sensor
  • Pair of lenses for sensors on printer

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.

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

For most other brands of printers, the end-user is generally not encouraged to take the printer apart and do repairs on their own. Only later on, when you have considerable experience, and have taken advanced tech support training, would doing your own repairs be realistic. However I have visited many printshops where the printer operator prefers to receive this training precisely so they can do their own repairs. After all, if the manufacturer can train their own tech support person surely a printer operator, who also works with this printer every day all month all year, can also learn how to maintain and repair it (if they have the interest and inclination).

This policy varies by manufacturer. Interest in doing their own repairs varies by the end-user and by the printer operator. A few operators like the opportunity to take service training at the factory and thereby to be able to do basic repairs on their own. Most manufacturers discourage this, but some manufacturers do allow end-users to take advanced service training.

13. What is the cost of a spare parts kit?
The printer comes with a kit of spare parts at no extra cost. With some other printers you may need to pay up to $20,000 for a spare parts kit (especially when it includes extra printheads).

14. How does the total cost compare with other UV printers?
You can fill out the other columns for the other brands of printer that are on your short list. We can't fill this out for you, since we don't know what is on your short list.

Base price, chassis and print engine	Legend 72HUV $79,995			
RIP Software, lite	$2000 Onyx PosterShop			
RIP, full version	$4000 Onyx Production House			
transportation	$ 700 to Chicago			
installation	Included			
training	Included			
ink	2 Liters per color			
warranty	12 months			
spare parts kit	Included			
table(s)	Included			
Piping to air purifier	Optional cost but highly recommended			
Air purifier				
Total cost				

PURCHASING

15. Are dealers national (most companies) or regional (Roland allows a dealer to operate only within a limited regional area)? Does a buyer have any choice in dealers?
Dealers are national (LexJet) and local (such as Lloyds, in Indiana, which a dealers that is not directly associated with LexJet).

FEATURES OF THE PRINTER: Vacuum

16. Is there a vacuum function?
Yes.

17. Is the vacuum created by simple fans, or by an air pump?
Vacuum is created by two industrial air pumps. Actually there are two separate air systems: an air pump for creating negative pressure in the printhead (is self-regulating). And an air system for the vacuum portion of the platen.

18. In how many sections?
One section. But because you can control two separate pumps, you have some control over vacuum strength.

19. Can you turn one or the other section(s) off and on?
Yes. There are individual controls per pump. You can select which pump to use, or utilize both at the same time.

20. Just Off and On? Or variable?
Variable. The control is analog, with a round handle.

21. Does setting a substrate profile activate a higher or lower vacuum automatically?
Not yet, but it can be expected in the next upgrades.

22. Are the vacuum areas (size and position) user definable?
Yes you can define the areas where you need vacuum.

23. Can the vacuum be too strong for thin materials, and cause them to deform?
Yes. You need to learn which vacuum to use for which materials. Flexible media may need a minimal vacuum of -3 kpa, which is in the range of vacuum you can get with one pump. Rigid materials will require the use of the two pumps. Depending on the weight, some materials will need up to -1.8 kpa (kilopascals). MDO boards require no vacuum. In general there is a moderate learning curve for which material does best with which vacuum level.

The vacuum area is created by two pumps. In the picture below, you can see the vacuum control buttons. The vacuum areas are user-definable.

STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path

24. Is there a moving transport belt (combo style) or a stationary platen (hybrid style)?

This is a hybrid style printer. The advantage of a hybrid printer is that it can print on both flat and rigid and roll-fed material. Since a hybrid printer has no transport belt, there is no belt to slip out of alignment.

But no joint-use printer can print on all materials perfectly: irrespective whether it is a $80,000 entry level or $300,000 machine. Also realize that the best machine to print on some heavy flat materials is a dedicated flatbed. But there is no flatbed under $140,000 that can print successfully on roll-fed material.

Every structural class of printer: hybrid, combo, or dedicated, has benefits, and a few downsides. No one single printer is perfect for everything.

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

Yes, at both the left and right.

26. Can you move the left guard, or the right guard, or both?

Yes, you can move each edge guard.

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

This printer was built from the beginning as a UV-curable machine with hybrid capability.

A hybrid machine prints on both roll-fed and rigid materials. The advantage of buying a hybrid UV printer is that you get a printer within a reasonable price that can handle roll-fed and rigid media. Consider that most dedicated flatbeds are classified in the mid-range price ($150,000 - $200,000).

LINING UP FLAT MATERIAL (to help it feed straight)

28. What kinds of raised guide bars along the side of the table exist? Left or right? How long?
There is a 2-foot long alignment bar at the back left.

Two guide bars come with the printer. An auxiliary media guide can be set into the table at any width. This is very clever, and may be unique for this DEC Legend 72UV printer.

29. Are there specially accessories on or above the side guides, or are they just a raised guide.
The main side guides are a basic raised bar with no additional accessories.
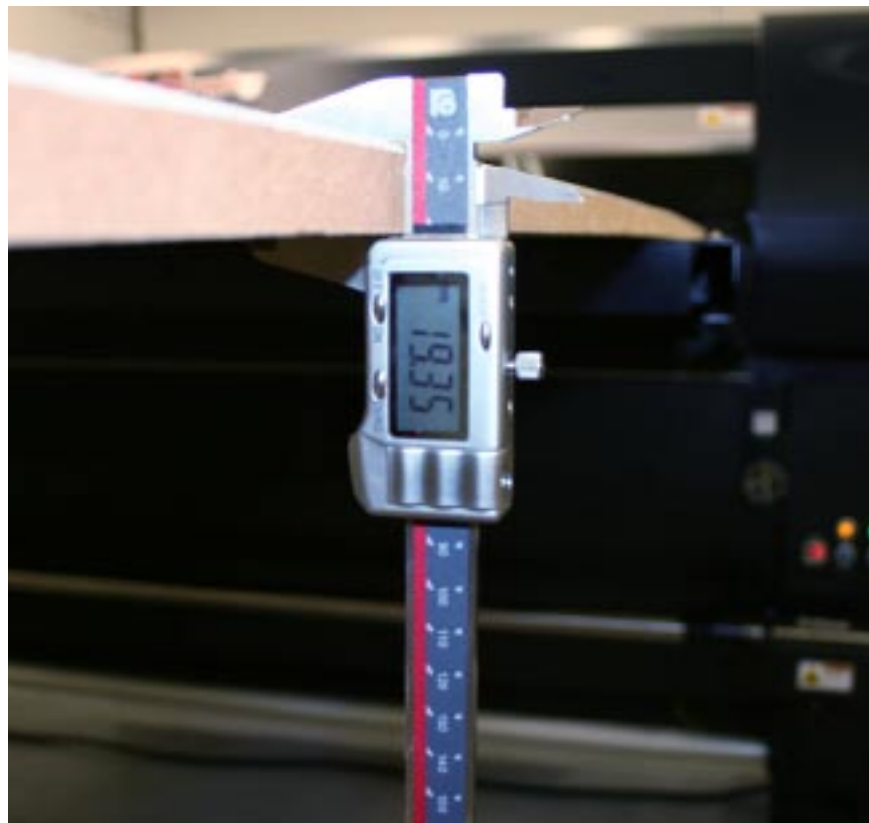
30. Is there a registration gate that is lowered across the back printing area?
There is no lead edge registration gate. The board is aligned to the printer with a side guide and sensors detect the lead edge for printing.

Most printshops report that most rigid media is crudely cut and rarely are the edges really at 90° to each other. So you don't really want to align a corner, you want to align one side (on one end).

Alignment bar at the rear table.

31. Is two-sided printing realistic? Is there a special mechanism for registering the position of the image on the second side?
Yes it is possible. A board edge detection system tells you what offset to print relative to the leading edge.

32. Do you have to hand measure the media height, to enter it manually into the software?
Yes and no. The operator should double-check head height to avoid head strikes.

33. Do you have to measure the media size (width and length) manually and then enter it yourself into the software?
The printer does not have a feature to measure each board. But Onyx RIP software has quick sets to handle standard sizes.

Most media is not really flat. Quality and flatness vary from brand to brand. So you need to learn from experience how to calculate the true height of the media.

Measuring the substrate is one important factor to avoid head strikes.

ROLL-FED

34. How is media held flat? Vacuum table? Pinch rollers?
Pinch rollers are the primary mechanism to hold media down on a hybrid printer. A vacuum-assisted platen also helps, but this is not the same as a full-scale vacuum table on a dedicated flatbed printer (which would cost twice as much as a hybrid style machine).

35. How is roll media fed? Pinch roller against grit roller?
Yes, this has a single set of pinch rollers against grit rollers.

36. Or does the printer use tension rollers instead of grit rollers?
Grit rollers tend to be used for hybrid style UV printers under 2.x meters in width; tension rollers tend to be used for printers of 3 meters and wider. Plus grit rollers are rarely used on a combo style printer because the transport belt is what moves the materials. On a combo printer there is not really a place to put grit rollers since the conveyor belt occupies most of the available space.

Grit rollers at the bottom, working in conjunction with pinch rollers at the top, with a basic vacuum in the middle (under the platen) is to provide you with the lowest possible cost for entry level. But the grit-against-pinch roller system work best on certain materials, and are not perfect with other materials.

37. Can you raise an individual pinch roller, on only the entire row?
On the Legend H72UV you do not raise an individual pinch roller. On some other hybrid systems it helps to raise any pinch roller that is over the edge of the media. This is one way to help alleviate skew. So sometimes you would need to raise two individual pinch rollers (one at the left, one at the right). Of course this depends entirely on the width of the material and whether, by coincidence, a pinch roller happens to overlap the edge of the media at one side or the other, or both.

But if other design features help alieviate skew, you may not need to raise an individual pinch roller.

38. Can the pinch of the pinch rollers be varied?
Yes. Pinch roller pressure has 5 positions. Generally you can work in middle position.
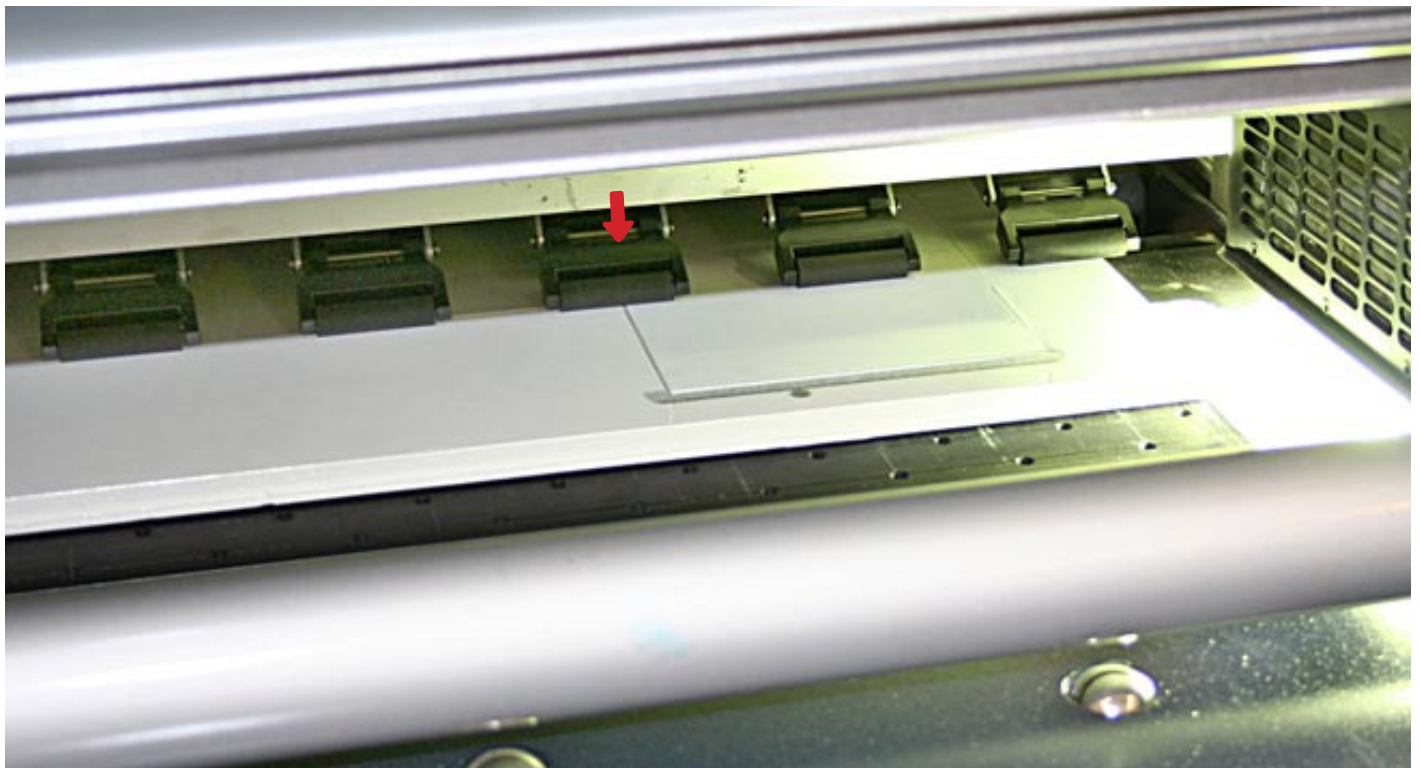
*The pinch rollers have the funtion to held flat the material.*

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

A saddle, which is not used on this printer, nor on mid-range either, is formed of two rollers with a slight space between them. You rest your roll of substrate on the saddle created by the two adjacent rollers. You don't need to run a spindle through the roll. But a saddle is primarily used on heavy-duty industrial printers 3.2 meters or wider where the weight of a roll may cause a spindle to sag. Plus, it's a headache to thread a spindle through a 5-meter long core.

40. Is there an air (pressure) core system?
Air core spindles tend to be used only on grand-format printers costing over a quarter of a million dollars.
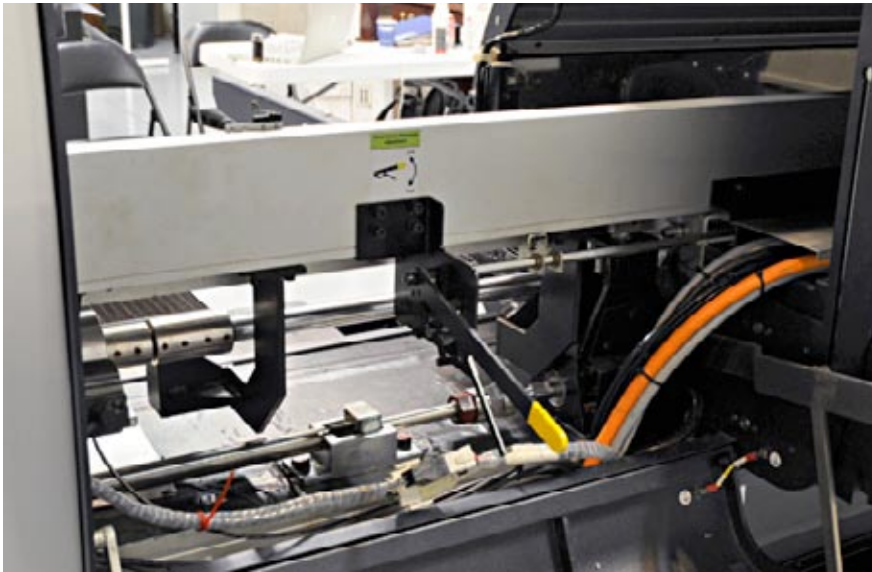
Substrates are held flat by pinch rollers against grit rollers. You can adjust the pressure of the pinch rollers with this yellow lever found at the back left area.

41. How is the roll media handled at feeding position? For example, is there a dancer bar? If there is no dancer bar, is there at least a tension bar?
A tension bar goes up and down. A dancer bar tends to move diagonally. Each one flexes as tension is needed. A printer will tend to have only one or the other (not both). There may be one such bar on the feeding side and another on take-up side, though a few printers have only one kind on only one side.

The Legend 72HUV has one flexible positioning bar on each side; the equivalent of a dancer bar.

42. 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.

43. How much media is wasted during loading and feeding?
With some brands of printers you suspect that they are deliberately designed to waste ink and media since this is how those companies get their profits. Media is moved too far out before you can cut it, resulting in media being wasted before and after cutting, etc.

*Take-up roller. Roll-fed media is held in a spindle at the back.*

There is less waste on a dedicated flatbed printer because there is no material used in loading or feeding up to the point it is printed upon.

Thread up waste on the Legend 72HUV can be minimized if the user prints on the lead edge until there is enough to complete the thread up. Worst case there is a few feet of waste.

44. Can you print on more than one roll of substrate simultaneously?
Being able to print on several different rolls of material simultaneously is common on grand format solvent-based printers but almost unknown (and unavailable) on printers less than 104 inches. The Durst Rho 351R offers an option to allow printing on two different rolls simultaneously.

With the Legend 72HUV you can print on two rolls of media at the same time if the two rolls are the same thickness and type of material.
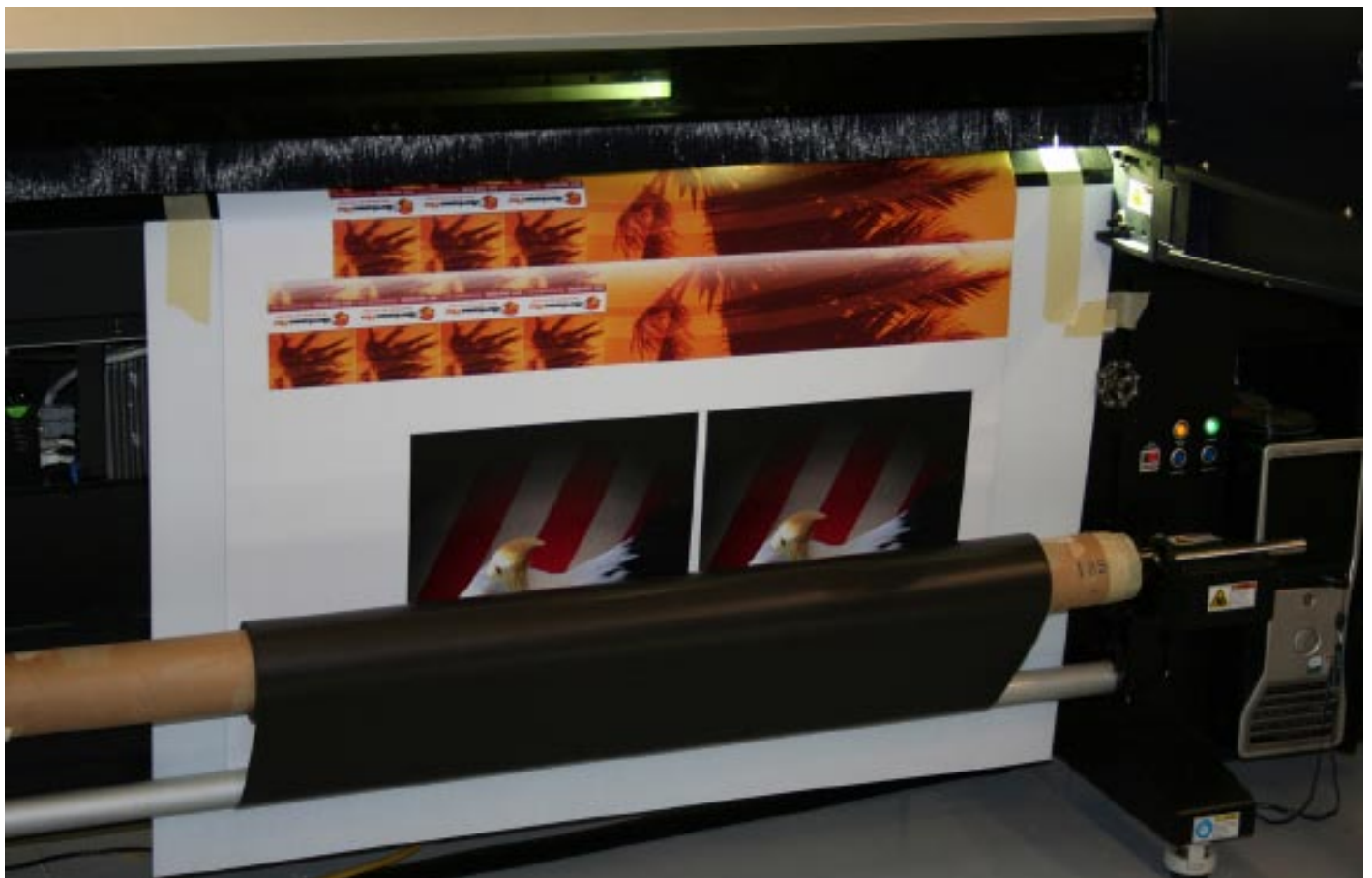
45. For handling ink that passes through the weave of fabrics or mesh, is there a trough? Or other mechanism to catch the ink?
A trough is possible only on a printer with a fixed platen. A trough for mesh or fabrics tends to be present only on a printer costing a quarter of a million dollars or more.

There is no easy way to put a trough on a combo style printer. If you need to print on fabric or mesh with a UV combo printer you need a liner or you need to put an intermediate sheet onto the surface of the conveyor belt (or clean up the ink that passes through the weave).

There is no trough on the 72HUV. If you print on a mesh with no backing, you will get ink on the printing platen.

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

There is no cutter; most other hybrid-style printers have no on-board cutters either. The Durst Rho 351R has a manual cutter since this is a dedicated roll-to-roll printer (meaning it has no moving conveyor belt). So roll-to-roll systems are more likely to have an appropriate location for a cutting element and even potentially a cutting slot.

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

Most hybrid-style UV printers have no area to put such a knife slot. Nonetheless, on the Legend 72HUV there is a knife guide in the platen area.

STRUCTURE: Miscellaneous

48. Does the printer have levels built into the structure of the printer?

No, it does not.

The only entry-level or mid-range hybrid or combo printer where I have noticed levels actually incorporated into the structure of the printer are the UV-curable printers of Dilli.

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

Yes. A total of four leveling supports. Some UV-curable printers have the leveling supports and wheels as separate elements. The supports of the DEC Legend 72HUV are integrated with the wheels.

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

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

The printer has four wheels in which leveling supports are incorporated.

51. Is the carriage moved by a magnetic field or a traditional motor?

The motor is an AC servo.
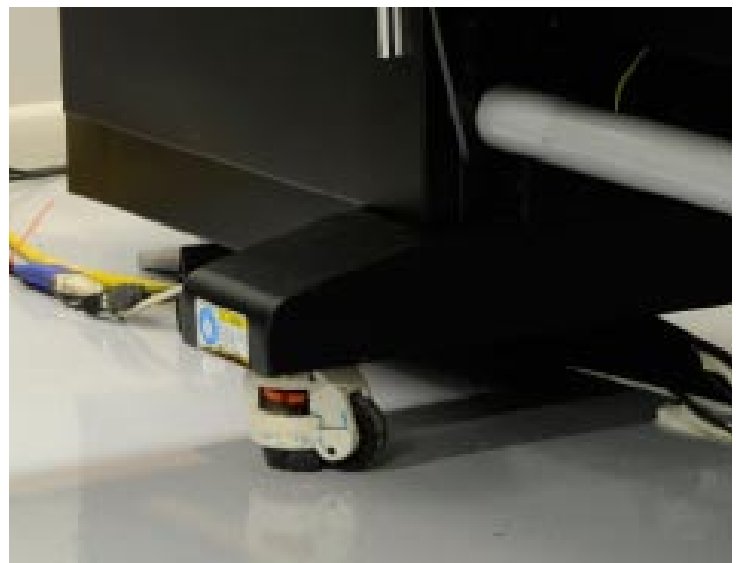
The printer has wheels and leveling supports built in the same structure.

TABLES for Combo or Hybrid Flatbed

52. What is the approximate size of the table?
75" wide x 3 ½ feet long.

53. Is this table size adequate?
No table for any hybrid or combo flatbed printer is large enough to handle a 4x8' MDO board, so everyone has to jerry-rig an extra table. DEC is at least helpful enough to recommend inexpensive and simple add-on roller systems that act as a pseudo extension table.

The front and rear table are characterized for being a flat surface attached to the printer, therfore, no legs or supports are found for the tables.

54. Do you need to provide an additional table at the front or back?
If you print material over 6' long, yes. Most printshops tend to jerry rig extra tables for longer materials. But some printer manufacturers offer additional tables if desired.

55. Are the tables an extra charge?
The original tables are included at no extra charge.

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

These tables are standard for most Flora printers: planks with roller balls. The advantage of a roller ball is so you can slide a board sideways. "you can't do this on a ColorSpan." You can pull up each "plank" and lean them against a wall, or better, lay them flat on the floor so they don't slide down.

57. If there is a row of rollers set into a bar, can you slide the individual bar to a new position?
It is rare that you can slide any individual bar, or roller, to a new position. The only table that I can remember that had movable features was that on the ColorSpan 72UV printers.

58. Does the table stick out with cantilever support only? Or does the front have legs for added support?
Yes, with cantilever support only; there are no front legs (or back legs either).

Tables are built up as a solid surface containing roller balls to move substrates into the printing area. Although this is not a very common design in UV-cured printer tables, the advantage of this design is that you can move media sideways.

59. Are there only two legs (at the front) or are there four supports?

The table is a flat structure that is attached to the front part of the printer with a cantilevered support concept. So no legs are featured. The table holds about 225 lbs. If the printer accepted thicker materials the weight limit for the table would have to be recalculated.

60. Do the legs have wheels, or leveling system, or both?

No legs, therefore, no wheels.

61. Is the front table (output side) the same as the back table (feeding side)?

The front and back table are identical, with the only difference that the back table has an alignment bar.

62. Why did your designers select this structure for the tables?

One of the designers stated that "The design was selected to make sure the printer could be moved through a standard 36' door way for installation and so that the printer footprint could be reduced while not in use or in the roll to roll mode. The advantage of this design is that you can pull up any of the planks and lean them against a wall, or better, lay it flat so they don't fall down.

Tables are held with cantilever support. Although both front and rear tables are physically attached to the printer, detaching them takes about 5 minutes.

63. Is the table physically attached to the printer? Or just rolled up close to the printer?

Yes, tables are physically attached to the front and back parts of the printer.

64. How much weight can the feeder-table or take-up table hold?

The table can hold 220 lbs, but don't climb up and walk or sit on front edge of the table, because more than 220 lbs, or all a weight concentrated just on the outer front edge, might cause the entire printer to tip over. Otherwise, however, of course the printer will not tip over on it's own.

65. Is there a minimum size for a single rigid board?

User´s Guide says 17" narrow, but in reality you can handle 5" boards: "You need to have at least one grit roller under the board and two pinch rollers on top."

66. How long does it take to change from roll-to-roll to rigid?

About 5 minutes

67. Are there edge alignment bars on the table? At left, or at right, or both?

The back table has an alignment bar at left.

The table holds up to 22 kg. Besides thickness, take in mind the weight of your rigid materials.

UPGRADES, Future Improvements?

68. What features have been added, or changed since the printer first appeared?
This is an improved version of the DuPont Chromaprint 18UV. Among the improvements, we find that the ink delivery system has been removed. Dedicated ink bottle was too complex, so they got rid of it. Then a simplified user interface (software) was added.

The DuPont Chromaprint 18UV at ISA 07. After 2007, neither the DuPont Chromaprint 22UV nor the 18UV appeared in trade shows any more.

If compared with its predecessor, the LexJet Legend 72HUV has been significantly improved.

69. What features have been added in the last six months?
- Quick connect for the flushing pumps and general engineering upgrades.
- Beefed up bearings on the carriage motion (X-direction). This change took place before the first printer was shipped.

70. What features are being added, or changed in the next month or so?
"Not needed because design is stable".

71. What firmware upgrades have been made available?
Firmware upgrades are already achieved.

72. What new firmware upgrades are likely in the future?
"Nothing specific is planned at the present time because needs are already satisfied."

Miscellaneous

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

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

Most traditional combo style UV printers move rigid materials with the transport belt and move roll-fed materials through a combination of the transport belt and the roll-feeding and take-up rollers.

This is a hybrid printer, meaning there is no transport belt. So the printhead carriage moves back and forth within the fixed position that is covered by a complete enclosure.

74. If the objects you are printing are not as wide as the full width of the printer, does the printing carriage still have to cross the entire space, or can the printing assembly hover just over the area of what has to be printed (and thereby be a bit faster?).
Yes, the printer can hover, but it is the operator´s choice. Most sophisticated printers can hover. But this may cause too much heat build up over one part of the printer. So your software also needs to be able to modify the hovering position if so desired.

75. Is there a light inside when you open the hood?
No.

OPERATING THE PRINTER

76. Can the operator manage print jobs via the Internet with this printer?
No.

77. Is the printer user friendly?
While I was in the demo center a woman from Indianapolis was being trained to operate the printer that I was inspecting. I asked her if she felt the printer was user friendly, she said yes.

78. What sensors does the printer have?
There is a host of sensors for the maintenance station. Some of the printer's other sensors are:
- UV light ON or OFF detection
- Door open sensor
- UV lamp temperature sensors
- Out-of-flush sensor
- Ink-overflow detection
- Full waste tank sensor
- Lead edge sensor
- End of board sensor
- Negative pressure sensor (There is a also a valve for each printhead which stops gravity leaking)
- Vacuum on platen sensor
- Printhead height sensor
- Ink level detection sensor

79. Which materials are pre-established in the software, or do you have to create the settings for each class of material yourself?
The operator has to set the parameters for the material every time.

80. Do you get an LCD screen in the printer or a real computer monitor? How big is the screen or monitor?
Most printers provide only a 15" or 17" monitor. With the Legend you get a 19" monitor.

81. Is the position of the LCD screen or monitor user-adaptable?
The screen is not attached to the printer, so you can place it anywhere.

82. Where does the computer keyboard sit?
Anywhere within reason, because you decide where to make your station.

83. Can the keyboard be moved or is it fixed into the structure of the printer?
The computer, and monitor, can be moved anywhere; only the position of the computer is fixed (inside the printer).

84. Is there a drawer under where the computer keyboard is (a drawer for storing odds and ends)?
No drawer.

85. Where does the operator stand or sit?
The operator can situate himself anywhere he wishes.

86. What aspects of the printer can you operate from behind (the loading area)?
The lever to raise the pinch rollers is at the back left.
A flip-down panel is at the back right.
Some of the ink is loaded from the back
       • Flush liquid
       • Black ink
       • Waste bottle

The back hood can be raised if necessary.

87. What controls are on either end?
Both ends have stop buttons on the top. The right end has a handle to adjust printhead carriage height with a meter display. Buttons to maintain the printheads are on the left side.

88. Can you do unattended printing? For how long? How about overnight?
If carriage is not printing within 5 seconds, lamps shut down. This prevents a fire. "Although not recommended, you can allow the printer to print unattended. You could set the printer up to print a complete roll of media in an unattended mode if it is the same job that is being printed every time. If you want to queue different jobs, the safety sensor to prevent head strikes will prevent an unattended print mode."

89. Is there a pole with beacon lights?
No.

Dilli was among the most noticeable to always use a vertical pole with beacon lights. It has been suggested that the DuPont 22uv was actually the first printer to use the beacon concept. Most other printers do not have such a beacon. Presence of a beacon is not a major plus point; absence of a beacon is not a significant minus point.

Printhead height lever

CONSTRUCTION (BUILD QUALITY)

90. When designed, what is the life-span that each part is tested for?
For many manufacturers, parts life-span is a new concept, especially when the cost of the printer needs to be kept down. So the present philosophy of the manufacturer is to have "minimal downtime during the first three years." DEC states that "Our components and modules are tested for a 3 year or better life expectancy."

91. What is the solid-ness of the construction of the outer body? Is it plastic? Metal? Heavy gauge?
The printer is primarily metal; even the silver-colored end caps are metal. They are powder coated, baked on, so the finish is durable.

Solid-ness of the printer.

92. Is there both a front hood and a back hood?
There is a front hood and a sort of a back hood. But it seems to be the same structure. The Gandinnovations 1224 UV has individual "wings".

93. The hood, is it strong, or cheap plastic?
The hood is made of strong metal. There is no glass, no Plexiglas, except for the lower skirt.

94. Does the hood have a frame?
No. The hood is a solid structure that does not have glass nor Plexiglas, except for the edge, so the main part is metal, then a narrow strip of Plexiglas, then the skirt.

95. How would you describe the overall workmanship of visible parts? Clean (Swiss made), or flimsy and uneven (several Chinese-made printers)?
The overall workmanship is acceptable for an entry-level printer. Several portions of this printer could be judged to be more robust than entry-level printers made in the USA.

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

97. After you have used the printer for a while, do screws begin to shake free?
"After seven months the only issue with one installation in El Paso, Texas, was that a motion control board was DOA at install." Compare this with two Infiniti UV printers that I inspected last year and the year before: they had endless problems every month: one was replaced twice and then the owner simply said he wanted to have his money back. So far this kind of situation has not happened with the Legend.

98. After you have used the printer for a while, do parts quickly wear out, break off, wobble, or malfunction?
Normal wear-and-tear impacts all printers, even those that cost a quarter million dollars.

AESTHETICS

99. How would you describe the design of the printer?
Attractive.

100. Can you easily distinguish 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 UV-curable printers have a moveable control computer that can be situated at one end, or at the feeding area (whichever location the operator prefers). But the standard arrangement is that the LCD and keyboard are on the output side. I call this the front.

LexJet Legend 72HUV printer.

SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS

101. What is the delivery time, between the time I order the printer and it is delivered?
2 weeks.

102. What are the electrical requirements of this printer? This means, will the building have to be rewired.
Main control and UV supply – 220 VAC, Single Phase 30 A, 50/60 Hz.

103. Do you need to budget installing a ventilation or room exhaust system?
DEC thoughtfully offers an air scrubber for the Legend printer. The customer is responsible for selecting the location to plate the scrubber and for running the air duct from the printer to the scrubber.

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

104. Are there any special temperature or humidity requirements or preferences of this printing system?
For the Legend, the general rule is if the operator is comfortable, the printer will operate properly. If the room is over 90F, the printer will still operate, but there may be a loss of image quality. So being realistic about 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.

105. What about altitude? Some cities such as Guatemala City are at a high altitude?
Almost no spec sheet and not even many User Manuals mention anything about altitude. But Guatemala City is about 1500 meters above sea level (which is rather high; there are four volcanoes visible out my window as I write this), and other parts of the world have even higher elevation.

106. What about dust and cleanliness of the air?
Dust in the printing environment is an aspect that is often neglected. It is crucial that if a sign shop, that no sanding, sawing, routing, sandblasting, or grinding operations be nearby. The dust and debris from sawing and comparable operations are extremely unhealthy for a UV printer.

In other words, you need to ventilate away more than ozone and ink odors; you need to ventilate away everything else that is already in the printshop environment.

107. What is the connectivity? Network, SCSI, FireWire, USB or USB 2, or other?
Network. PC to printer is serial.

108. Does the printer come in one piece? Does this mean you have to remove a wall to get the printer this size into your office?
Yes. You will have to consider the dimensions of the printer and your facilities before making a decision, although, the specifications brochure indicates the printer fits through most door openings. The tables are detachable. This printer will fit through a standard 36" door.

109. What is the size and weight of the printer?

	Width	Depth	Height
With tables attached	10.75 ft (3.28mt)	7.58 ft (2.31mt)	4.42 ft (1.35mt)
Without tables	129" (3.28mt)	31" (0.79mt)	53" (1.35mt)

You get one crate for the printer and one or two boxes for the computer and monitor. The air scrubber is another box. Filters, printheads, and other items may arrive in other boxes.

111. What size and kind of forklift truck do you need? Or do you need a crane?
You will need a rigger for most UV printers. A rigger is a company to help move the printer from the truck into your plant. But if you have a forklift, with a 12-foot extension, that can lift 5000 lbs, then you can consider taking the printer off the truck yourself (with no rigger needed).

112. Does the printer have lifting hooks on the top, or elsewhere?
The printer has yellow brackets to help the rigger.

INSTALLATION OF THE PRINTER: INSTRUCTIONS & MANUALS

113. How many manuals are available?
User's Manual, Safety Manual and a Pre-Install manual

114. Which manuals are hard-copy? Which manuals are only on CD?
The User`s Manual is hard copy, 87 professionally designed pages. This manual is better (more user friendly, and definitely better English) than the manuals for some Japanese-made UV printers.

The Safety manual and pre-install manual of about 16 pages are offered in PDF format.

You get a CD for spare parts.

115. Is there a Site Preparation Guide? If so, is it helpful?
Yes.

116. Is there a glossary in the User's Manual?
Yes. Basic entries. The manual has also an appendix where you will find a power-up procedure checklist and a shut-down procedure checklist.

At the very end of the document you will find a Spare Parts List. The latter is very helpful because it contains detailed information as
- Product code
- Part name
- Part function description
- Weight
- Photographs

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

118. What kind of cut-away drawings or other drawings exist that show the various parts of the printer?
The manual prepared by DEC for the Legend 72HUV includes many photographs, for example, the spare parts list has a picture of every single spare part, along with its description.

The best exploded views of any product in the world are those by Canon camera.

119. How hard, or easy, are the manuals to obtain BEFORE you buy the printer?
I was given a manual with no hesitation. Some printer manufacturers hide their manuals because they don't want anyone to see them (Luscher tried this ploy; of course I obtained one anyway from other sources). Yet MacDermid ColorSpan offered their manuals openly on-line (on their web site). So the policy varies by manufacturer. We do a full report only on those printers where the manual is available to us.

120. Is installation included in the purchase price?
Purchase price includes three days training at DEC´s facilities and 4 days of on-site installation and training.

121. How many people come for the installation?
One or two.

122. How many people are required to lift, move… the printer during installation? How many people do you need to provide for the installation?
None needed other than rigger.

123. Do people also come for a pre-installation site inspection? Or is the inspection just a form sent in by e-mail or fax by the print shop to the distributor? From the factory or from the distributor or from the dealer?
This will depend on the location and situation.

TRAINING

124. Is training included in the purchase price? If so, what kind of training is offered?
Yes. The purchase price includes 3 full days training (includes airfare, hotel and meals for one person) at LexJet´s training facility in Florida and four days of on-site installation and training.

It is increasingly popular to train at a demo center (not at your own printshop) because if you are in your own home town your attention may be elsewhere. If you are out of your shop, and in a training facility, then you can train full time.

125. Is training necessary?
Yes, training is essential for any UV printer, whether an entry-level machine or high-end. Lack of training, incomplete training, and lack/or of experience are a factor in about a third of the problems that people have with UV printers. Another third is often inadequate cleaning and maintenance of the ink and printhead system. The other third cause of problems would naturally be weak parts (that wear out before they should), wear-and-tear (happens even to the strongest parts made in Switzerland), and features that need improvement, etc).

126. Is classroom training available?
Yes, it is available in Digital Equipment facilities (Sarasota, Florida)

127. Is factory training available?
John Crumbaugh is the tech services international trainer at the demo room in Sarasota. There is no factory training yet available.

128. What on-line training is available?
There is no on-line training.

Fewer than 5% of the UV printer manufacturers offer on-line training.

129. What about follow-up training after you have had the printer a month and know enough to ask better questions?
Follow-up training is available as often as you want.

130. What expenses do you have to pay relative to training? Is training at your site (so you have no transportation costs) or do you have to send your people to be trained at the manufacturer (you have to pay airfare, hotel, and meals)?
For initial training everything is included.

131. 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 have to consider $600 to $1000 for a rigger for a half-day of installing equipment.

132. Between the day the printer arrives, how soon is it realistic to achieve full productivity?
Within two days, but it depends on the operator´s background.

If a printer is mature (and out of beta stage) you can achieve full productivity within a week or month. But many owners have told me quite frankly, that it took them several months to achieve full productivity (especially owners of the Luscher JetPrint). The longest time before a printer is really productive is when a printer is still in beta stage when you buy it. It takes a while for the firmware and hardware to be improved and updated.

133. How much of a learning curve is there?
"Master one substrate at a time."

TECH SUPPORT & WARRANTY

134. What is the original warranty period?
12 months.

135. Does it include parts, labor, printheads?
Warranty includes parts and labor. Printheads are covered by a period of 12 months or 24 liters of ink, whichever comes first. The warranty for these printheads is prorated and the limitations are specified by the warranty conditions, which you receive in the binder (with the user's manual).

136. What sort of serious technical assistance is actually offered? Do the tech support operators read from a script and only get a real technician later on?
You are offered professional tech support.

137. What training does my tech support person have? Is he factory trained? In what language? How many tech support people are available to cover the US (or Canada…)?
Tech support personnel is factory trained in English. Two of them worked on the predecessor model for the R&D department of DuPont. They have had experience in pre-press tech support for years, such as working for TSI, Tech Services International (later bought by Kodak).

Currently there are four capable service people with prior training and tech support. More have not been needed since "so far not many problems"

As more printers are sold, tech support will be expanded via GEI, but presently all tech support is from the team who have been with this UV printer since it's inception via DuPont.

One example would be John Crumbaugh, who has experience already with Tech Services International.

138. What are the hours of tech support? If support is from eastern time zone, hours should be at least 8 am through 8 pm to cover users on the West Coast.
8 am to 5 pm in theory, but in the reality tech support is offered from 8 am to 8 pm because of Texas. Also, during installation the printshop can ask for the cell phone number of the tech support person, so in theory you can request tech support after hours. This is something that was not possible if you bought the $650,000 Luscher Jetprint flatbed UV printer.

139. What happens if the tech support from your local distributor is uninspired or inadequate? Can you telephone the manufacturer directly? If so, will be manufacturer actively assist you, or only begrudgingly?
MacDermid ColorSpan was good at providing direct manufacturer's tech support in past years. Whether this will continue under HP ownership is not yet known. Dilli also can provide manufacturer's tech support if absolutely needed. Some other manufacturers simply don't provide tech support themselves, or only begrudgingly: they expect their dealers to provide support. We have several instances in Australia of poor tech support for GRAPO printers and the printshop owner rated the backup from the manufacturer in the Czech Republic as unsatisfactory (that's putting it about as politely as I can; the situation was quite unbearable for two owners in Australia). GRAPO did not refuse support, but not enough was spontaneous to resolve the situation with the end-user.

An inadequate dealer or distributor is a good recipe for endless headaches. Choosing a distributor is as important as selecting a brand and model of printer.

If the customer calls DEC directly, DEC will do their best to try and help the customer. Also realize that the two principal tech support personnel of DEC were the engineers who designed the improvements to this printer in the factory in Asia.

140. Can the manufacturer remotely diagnose the printer?
No.

Remote diagnosis is rare, and not available on any mid-range UV-curable inkjet printer.

141. What is the native language of the tech support person?
English

142. Who does repairs? Dealer, manufacturer, distributor, or third-party?
Distributor and third-party company both.

143. Do spare parts come from another country? If so, what is the wait time?
Basic spare parts are stored in California, so these are available for next-day delivery.

CLEANING & MAINTENANCE NEEDS

144. How easy is it to access the area where you have to clean the heads?
Extremely easy.

Area to clean the printheads

145. How is head cleaning accomplished? purge, suction, manual, other?
You can either purge or suck printheads. There is an automatic wiper function

146. To initiate a purge, where is the control or button? Is it software generated or do you have to press a button? Is the button on the outside of the printer, or inside on the carriage?
There is a physical button near the maintenance station.

147. How many levels (strengths) of printhead cleaning (purging and/or sucking) can be accomplished via the firmware (software)?
One level for purge, one level for suck and one level for flush.

148. How often should you purge? Does the User's Manual honestly indicate how often you should purge?
At start-up, then after lunch.

149. Is purging done with ink, or with a flush solution?
You can purge with ink or with a flush solution. This is the choice of the operator.

150. If done with a flush solution, how do you add the flush to the printheads? With a syringe, or a manual button or toggle switch, or automatically with software command, or other method?
With most mid-range UV printers, you manually turn a valve to open the ink lines so that the flush will flow into them. In cheaper printers you have to inject the flush with a syringe by hand.

There is a separate flush delivery system on the 72HUV that pumps flush through the heads when the valve is manually set to the flush position.

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

152. The ink that is purged, where does it go? Into a drain/waste bottle, or into a drip tray?
Purged ink goes into a drip tray and then into a waste bottle.

153. How should you handle the drip tray? How often?
You should clean it daily. Drip tray is scraped clean to move ink down the drain.

154. Is there a capping station?
Yes.

155. Is capping on a sponge or on a metal fitting? Do you cover the caps with cellophane, or is capping direct?
Heads cap into a plastic fitting.

Printhead capping station

156. Where is the service area, at the left, or at the right?
At the left, but you can also access the printhead carriage at the right.

157. Are there wipers?
Yes. Wipers are at the left. In the service station.

158. Is there a vacuum suck cleaning system, like a traditional vacuum cleaner?
Yes.

159. Where is the parking area, "home?"
At left.

160. Is the service area the same as the parking area?
Yes

Service station, located at the right back of the printer.

161. Is the capping station the same as the service area or the parking area? Or separate from both?
Yes the capping station, the service station and the parking area are all integrated in the same place.

162. Is there a dip-station that is separate from the parking or maintenance station? Is there an off-printer dip or soaking station for the printheads?
No.

163. Does this printer spit, or "weep" ("flash") ink at regular intervals?
Not at the end of the pass, but you can set spitting via software when the machine is not printing.

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.

Although most UV printers do not require a band of printable colors along the edge, many UV printer manufacturers do recommend spitting. However some UV printers do not have a spitting capability.

164. Do you have to manually open and close a valve to let the flush solution flow through a printhead? Is it individual for each printhead? Or is it automatic from the LCD touch-screen or keyboard?
Yes, flush solution has a valve. You can flush each printhead individually..

165. Does the manufacturer provide any special cleaning tools?
You receive paint scrappers, a paint wiper and a starter set of clean room wipes.

166. Does the manufacturer provide any special cleaning liquids?
light-weight machine oil.

MAINTENANCE

167. What daily procedure is required at start up in the morning?
- Turn on the computer and open RIP software
- Turn on the air scrubber
- Check that emergency stop buttons are off
- Check that UV lights are off
- Turn main isolation switch on
- Turn three main power breakers, SK1 on (right to left)
- Push button AC POWER ON (a 30-second pause is required before turning on UV lights)
- Turn UV lights on (warm-up time is 4 minutes)
- CPU line switch is off
- Clean wipers/wiper blades
- Set ink tank valve to Printing Position.
- Open all head valves
- Adjust pump pressure
- Prime button 1st time – Press gray button twice in three seconds
- Prime button 2nd time – Press gray button twice in three seconds
- Adjust pump pressure
- Turn ON/OFF line ON
- Unit is now ready to print

168. What daily maintenance is required at night?
- Shut down RIP program
- Turn off computer
- Turn off vacuum pumps
- Turn off UV lamps
- Press blue button (Printhead Maintenance button) one time
- Flush heads individually (repeat the following a – c steps for each printhead).
    a. Set valve to flushing position
    b. Press gray button one time
    c. Set to closed position
- Tray cleaning
- Apply caps (push green button once)
- Turn off main power switches SK1
- Turn off main isolation
- Turn air scrubber off
- Check ink, flush and waste tank levels
- Inspect and clean platen.

169. What daily maintenance is required if you print the entire day long?
Nothing special. If there is a lunch time where the machine will not print, cap heads; after lunch prime. The printer will be ready to work again.

170. How expensive is replacement of the filters?
You should replace all filters at once: $500 – 4 times per year. 1 set = 5 bulk and 8 LCF's.

171. What part(s) of this printer need the most attention to avoid breakdown?
Printheads.

172. What self-maintenance does the printer do on its own?
None.

173. What is the most delicate, or complex, or time-consuming cleaning or maintenance chore?
Valves are difficult to understand. Close position is at 45°. Some people have found the valve postions to not be intuitive. There is a label near the valves that help. For someone who takes care of their printer, about 10 minutes each day should be dedicated to cleaning the maintenance station, checking ink levels, flush levels and the waste ink bottle.

174. What areas of maintenance are hard to access or hard to accomplish?
Lots of doors make everything accessible. I would note some degree of difficulty to clean middle of platen area if tables are attached.

175. How much time, media, and ink are used during regular cleaning, calibration, and maintenance?
You can purge heads either with ink or with flush solution.

176. Is there a sleep mode? Should the machine ever be turned off? Does this entail having a UPS unit to guarantee it is on all the time?
Yes. If the printer is unattended for half an hour, it turns itself to idle mode (and shuts down lamps).

177. How long can the printer sit unused?
If put into capped position, a couple of weeks.

If idle for more than several days, it is recommended to flush ink from print heads completely and replace with print head flush solution. Actually it is best to use your UV printer every day. If you are not going to use it every day, fill the system with flush solution and cap the heads (please note: this procedure varies considerably from one printer to another; some have no capping station; others you have to inject flush with a syringe).

Check with an experienced tech support person, but merely turning your UV printer on for a test print every few days is NOT what is meant by using your printer every day. It may be better to fill it with flush and not use it at all. But this depends on the plumbing system of your specific printer, so check with tech support: we are not a medical doctor for specific individual printing problems; just trying to get the message out: UV (and solvent) printers are designed to print; not to sit unused.

178. How should a printer be prepared for sitting unused for a long time?
Solvent printers need to be used every day. Otherwise the ink dries in the nozzles and nozzle plate of the printheads. It was an early mantra that UV ink escaped all the problems of solvent printers: that you never had to weep (spit at the end of every pass); that you never had to purge; etc.

But in reality UV-curable ink has comparable issues, plus the added problem of curing inside the nozzles. Cationic ink can cure spontaneously (once initiated) all the way back into the ink tubes. Fortunately most printers don't use cationic ink; they use free-radical curing chemistry.

But reflected light can cure the ink inside the nozzles; heat can cause gellation which can clog the heads. So in some printers the heads are capped at night; in some printers you have to fill the ink lines with flush if you don't print frequently. Indeed a UV printer is intended to be used every day. We just received an e-mail from an end-user whose ColorSpan UV printer had numerous issues. He said they used it seldom because of these issues. My first question to this printshop owner was whether the infrequent use was a cause of at least some of the issues. So what we can learn from these situations is that most UV printers are made to be used, preferably, all week, all month, all year. So far, the indications from the DEC tech support staff, is that the Legend 72HUV can handle being unused better than many other brands. This is the sort of aspect that will be important to ask about when it is possible to undertake a site-visit case study of the 72HUV in a printshop environment.

SAFETY & HEALTH CONCERNS

179. How is safety treated in the printed literature?
The authors of the manuals were aware of safety in the workplace.

GCC's StellarJet 250 UV manuals have among the best treatment of safety aspects; in other words, they tell you point blank some of the reality of UV ink and UV lamps. If the warnings do not make you cringe, they are not realistic.

180. How many emergency stop buttons are there? Where are they located?
There are two. Each one on top of each end. You can use them without damaging anything.

181. Is there auto-shut down if the operator sticks their hand into the system while it's operating?
To get hand in you have to open the hood and this makes the printer stop.

182. Is there any ozone suppression system inside the printer?
No. There is just a ventilation system that can evaluate ozone after it is produced.

183. Is the machine enclosed, or exposed?
The machine is enclosed. But front hood has a Plexiglas tinted window that to some degree lets UV light through. Not many UV printers are totally enclosed. The Gerber ionx is one of the few UV-cured dedicated flatbeds that is totally enclosed.
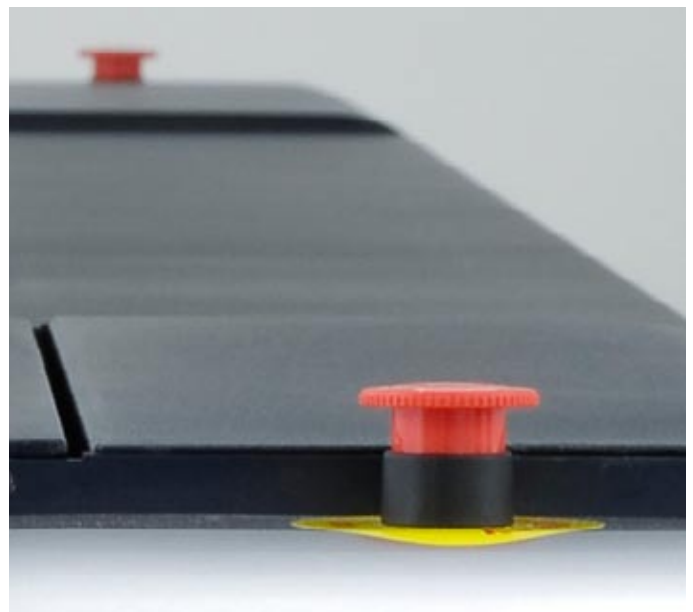
Emergency stop buttons

184. Does the hood close down completely to seal the system, or are there a few inches open at the bottom?
Below the Plexiglas stripe there is a gap to let materials through.

The hood on any hybrid or combo system must allow space for boards to pass through, so it's hood can never close down tightly onto the platen area. The design must allow space; this space should be closed off with a skirt. Some printers use flaps or rubber like material; other printers use skirts of brush-like material.

185. What kind of "skirt" exists along the bottom of the hood to prevent light leakage?
The printer has a brush-like skirt under the front hood.

186. Is there a skirt at the back as well as at the front?
No. The front hood is the only hood that has skirt.

187. 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?
You can find an exhaust opening at the right in the back hood.

188. What is the noise level, primarily of the fans for the vacuum?
The air scrubber makes noise.

189. Do the printer specs list the noise level?
The spec sheet does not list the noise level, but testing by DEC shows the noise level to be below 85db. This is well within OSHA recommended levels so that ear protection is not required by law.

190. What moving parts might hit a person if they are standing near the printer?
None. Since this is an enclosed printer, there is no part that could potentially hit a person. Some dedicated flatbeds are exposed, and the printhead carriage could hurt a person.
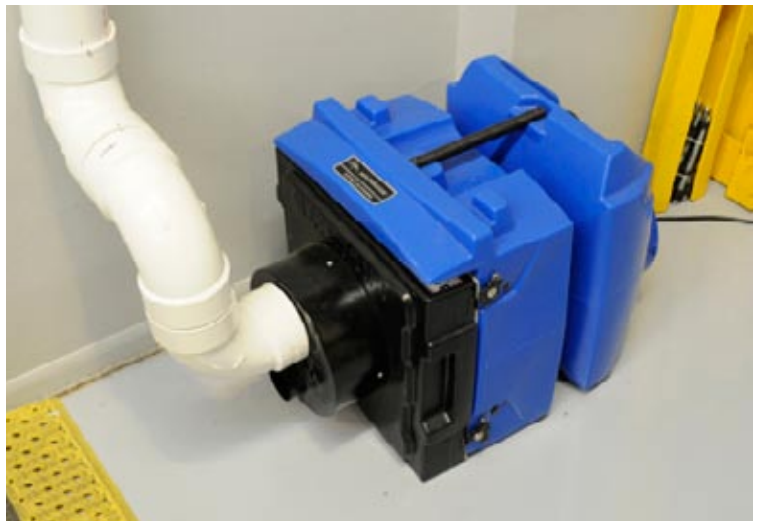
Exhaust system.

191. Are any other safety or health issues involved? Does the operator need to be concerned with any other safety precautions?

The operator should wear Nitrile gloves when in contact with ink or ink bottles. Digital Equipment Company recommends venting the printer to avoid inhalation of UV particulates.

192. 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?

The User´s Manual was written by Digital Equipment Company personnel (native English speakers).

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

The DEC MSDS is available upon request. When a change is made to the MSDS, DEC requests the dealers to notify all end users that there has been a change.

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. Fortunately LexJet is up front about the MSDS, and for the 72HUV it's MSDS is available on the LexJet website, 2 clicks once you are on the LexJet website.

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

There is a darkened Plexiglas strip that is supposed to eliminate harm to your eyes. But at a few angles or positions light could damage your retina (on every printer there are one or two positions where the light leak is very strong; the worst is the Oce Arizona 250 where there is no enclosure at all). The User`s Guide advises to use safety glasses, and never to look directly to the UV light.

Safety glass is raised, so in this photo you see what you are being protected against.
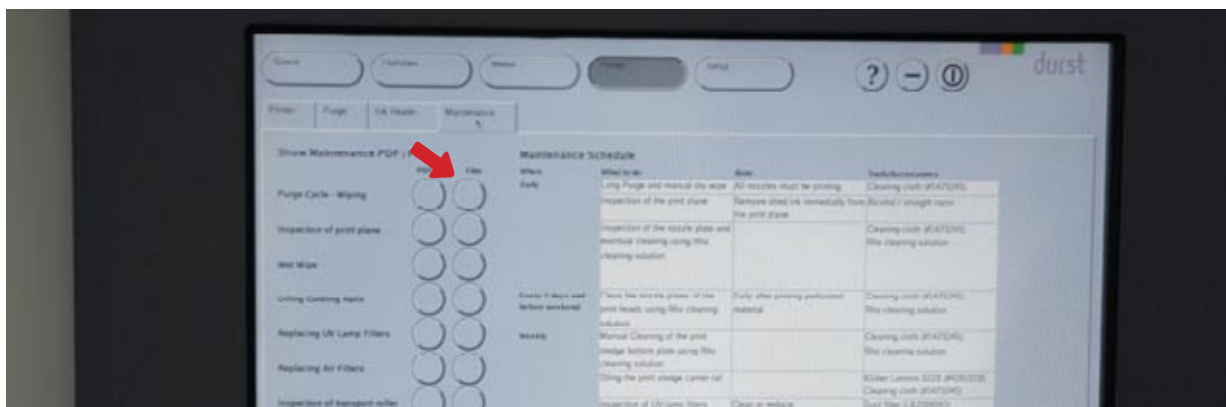
Safety glass lowered to protect the eyes from the UV light while printing.

PRINTHEAD TECHNOLOGY

195. Which brand printhead is used?
Spectra.

Most UV printers made in the US, Japan, and Europe use Spectra, Ricoh, or KonicaMinolta heads. VUTEk is one of the few that uses Seiko printheads. It is reported that one downside of Seiko heads is that they must spit (which waste expensive ink). Most Rho printers do not have to spit except for white ink. Now, in 2008, several printer manufacturers are returning to Xaar now that their newer heads offer features not available earlier. Spectra heads have the reputation for being industrial strength and thus potentially long lasting. Another aspect of Spectra heads is that they require a more sophisticated printer electronics and ink delivery system than cheaper heads. The quality of a Spectra head is why this brand is used in most Gandinnovations UV and solvent printers (which cost over $225,000 per printer).

196. Which model of printhead is used
Galaxy 256/50

197. Is the printhead identified in the spec sheet brochure by brand or also by model, or not at all?
Yes, the printhead is specified by brand and model in the spec sheet as well as in the User´s Guide.

198. How many other printers utilize the same printhead? Have they shown any problems?
Spectra printheads come in many different models. Other Spectra printhead models are used by Dilli Neo Plus, Agfa :Anapurna X, HP Scitex XP5100, and many others. Inca printers started with Xaar printheads but they switched to Spectra.
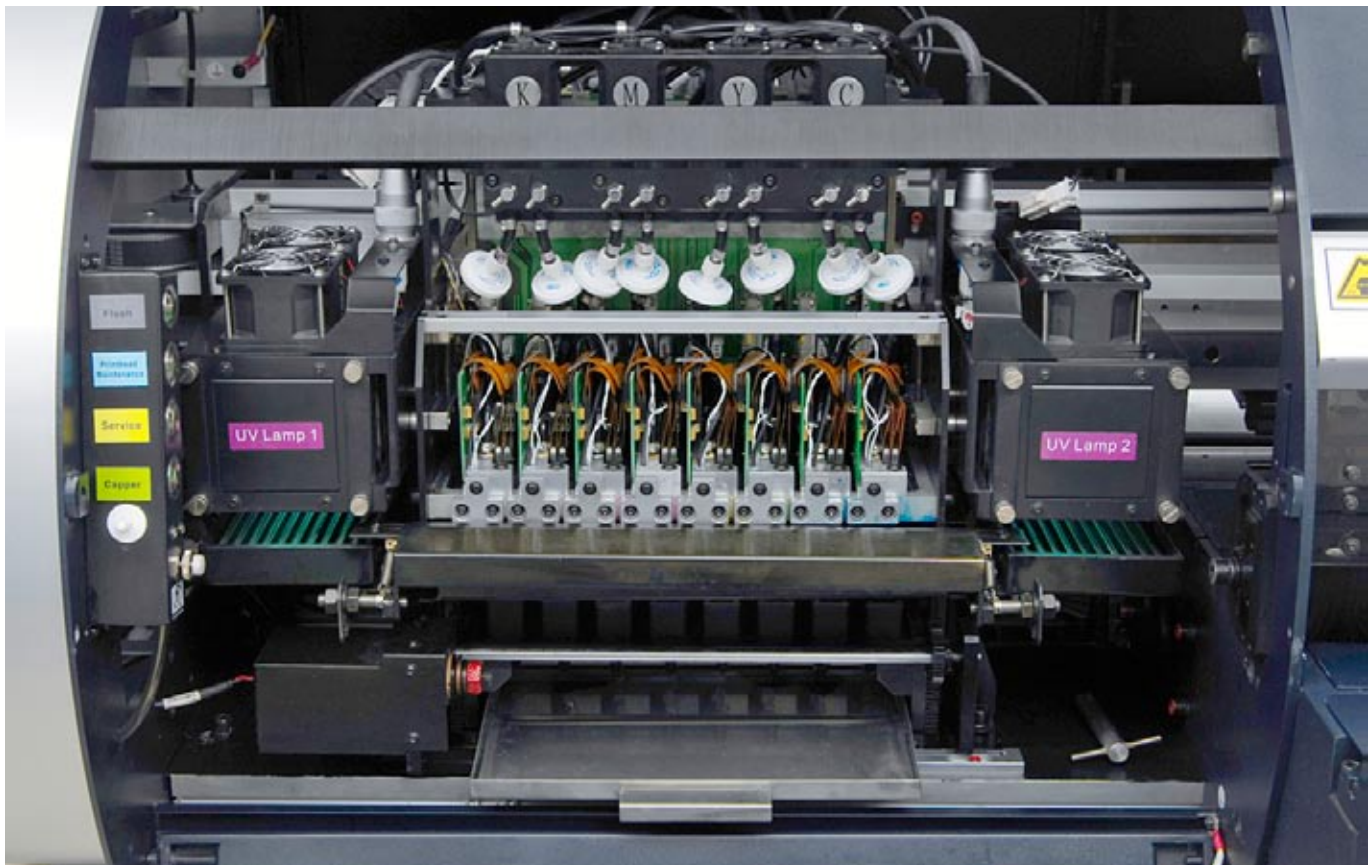
Printhead carriage, with the hatch open so you can see the details; you will not see many printhead carriages this neatly organized and precisely engineered on lesser priced printers. In other words (to be polite), if you pay less (for some other cheaper brand) you will not likely get a well engineered printer, and certainly not any Asian brand that has US quality control personnel inspecting the factory and serving as consultants.
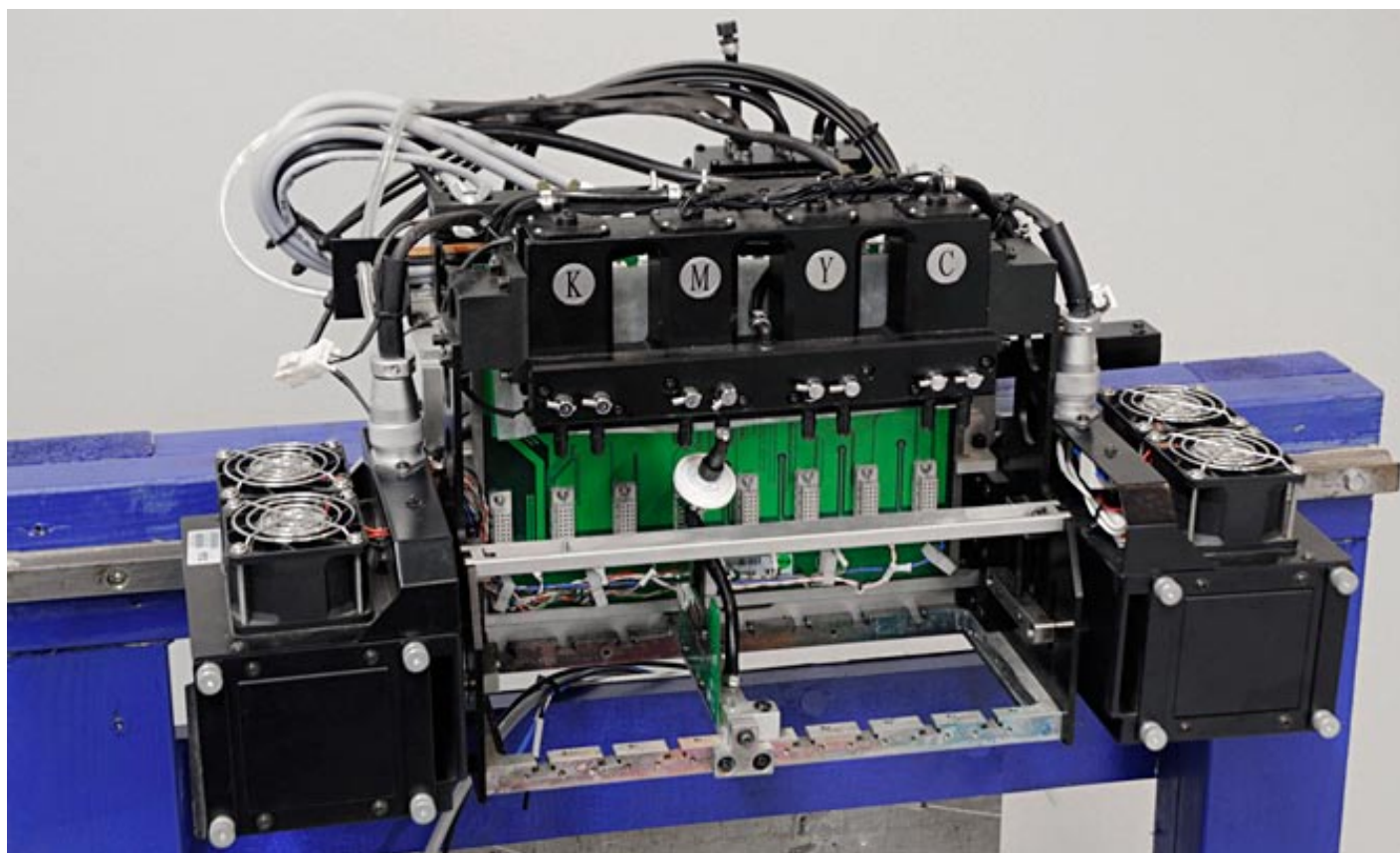
Printhead carriage.
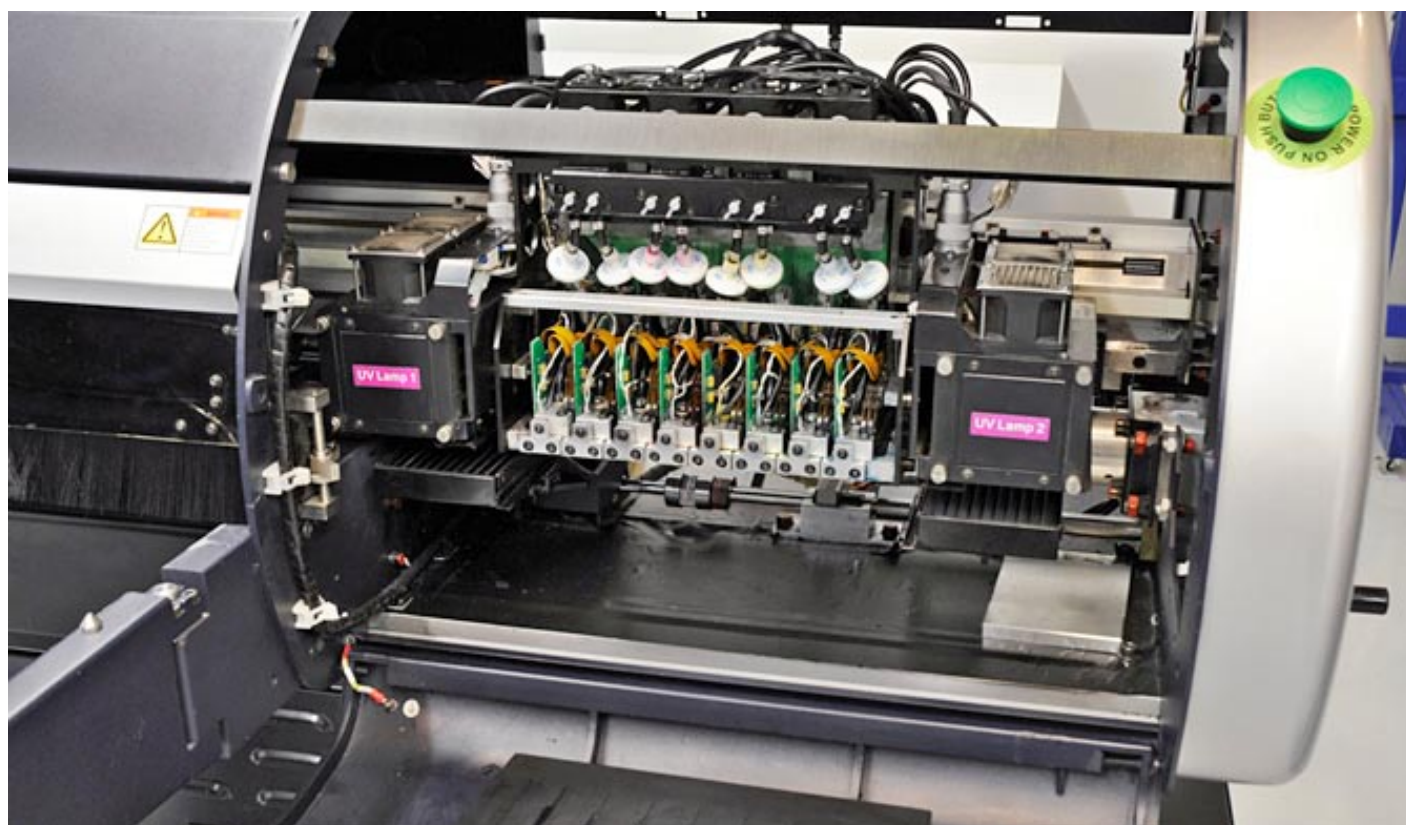
199. How many nozzles per printhead?
256 nozzles per head.

200. How many printheads per color?
Two printheads per color.

201. How many total number of printheads?
Eight printheads. This machine prints CMYK. 2 heads per ink.
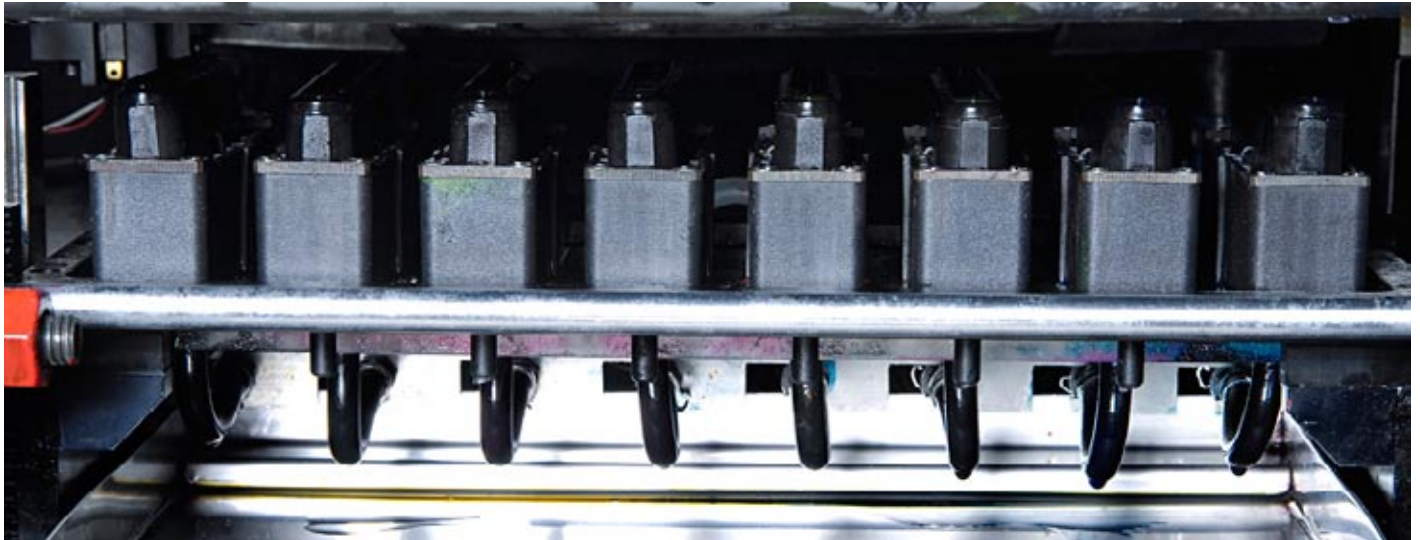
The LexJet Legend 72HUV printer uses eight Spectra Galaxy 256/50 printheads.
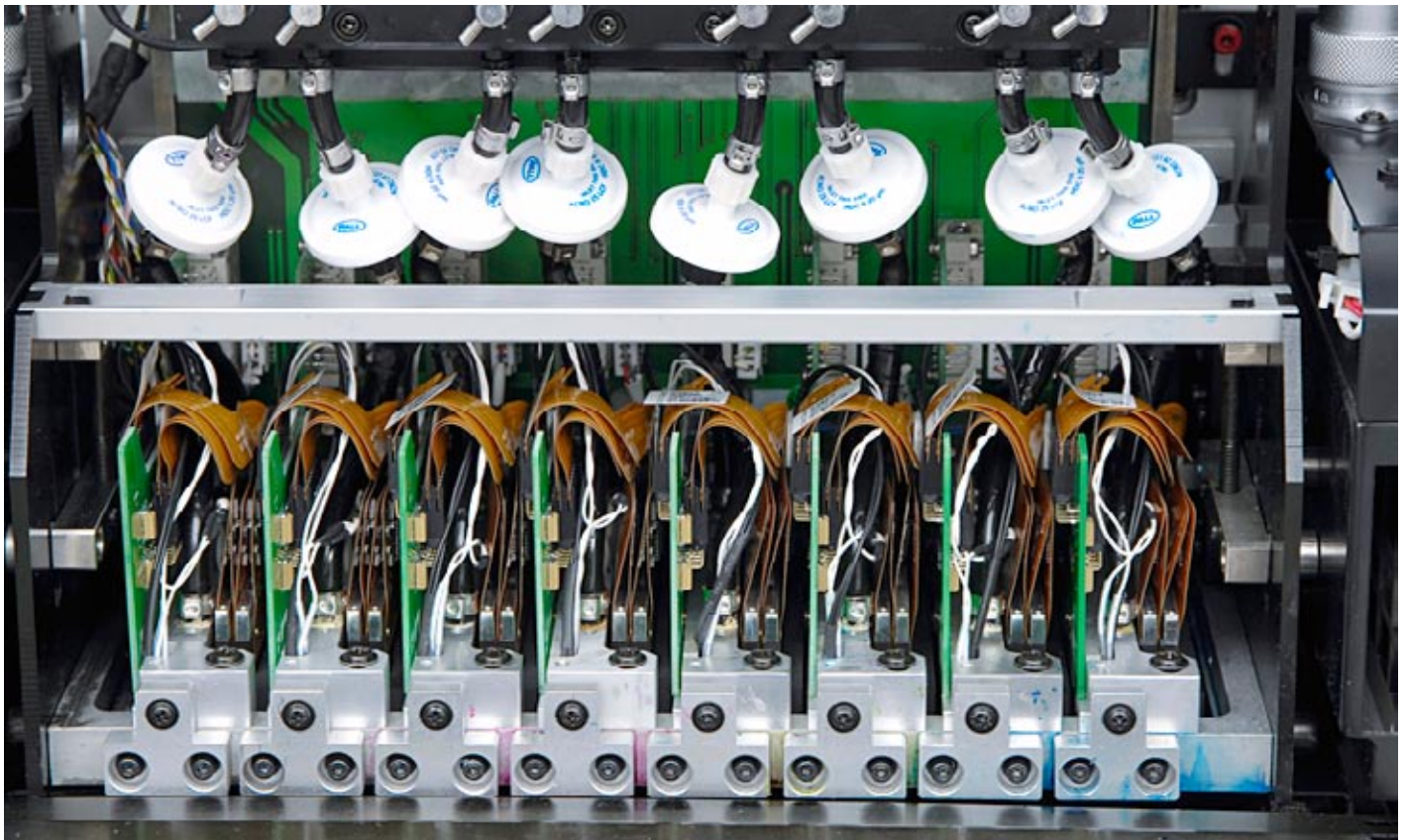
202. What is the position of the white printheads relative to the rest?
There is no white ink yet.

PRINTHEAD DPI & Features

203. What is the drop size in picoliters?
50 pl

204. Is there variable droplet capability?
75% of the UV printers do not have variable droplet or grayscale droplet capability.

205. What is the dpi of the encoder strip?
The encoder strip is 2540 dpi.

206. 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?
Spec sheet mentions two options:
• 400 x 200 dpi
• 400 x 1600 dpi

The User´s Guide parts list mentions 200 dpi (for the printheads?). But what counts is perceived dpi, which is achieved by multiple passes. The perceived dpi of this printer is plenty good enough for signage.

207. How many passes can this printer achieve?
Fastest mode is 2 passes. Best quality is up to 32 passes. The tech support person of a Teckwin TeckSmart UV1600 mentioned that output was not really sellable at 2 passes. Some operators call this the draft mode.

The lower the number of passes, the faster the printer prints, but the lower the quality. At a printer's fastest rated speed, the output is usually unusable for most applications other than distant viewing for a billboard or banner. To achieve viewing quality for Point of Purchase or an honest photo quality, you generally need to set the number of passes at the highest number (which results in the slowest speed).

208. Does the software use passes or modes to describe quality levels?
The production speeds in the spec sheet is listed as follows
• At 300x200 resolution, 2-pass, 652 square feet per hour
• At 400x600 resolution, 6-pass, 213 square feet per hour
• At 400x800 resolution, 8-pass, 178 square feet per hour

FLAAR prefers to use consistent terms that are standardized for all printers so that printshop owners, managers and printer operators have a fair chance of comparing speed vs quality. By not identifying the actual passes, or by defining pass in an atypical manner, this results, in effect, in hiding the reality of speed vs quality. Thus we commend those companies that keep to, or return to, the traditional usage of the term pass(es).

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

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

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

Bi-DIRECTIONAL VS Uni-DIRECTIONAL PRINTING

209. What is the direction of uni-directional printing? From right to left, or left to right; or both?
Printing is from right to left.

210. Is printing bi-directional or uni-directional? What are the different results in speed; in quality?
Printing is generally bi-directional. "No advantage in uni-directional with this printer, so we designed this machine to print bi-directional". But if you absolutely wish to print in uni-directional mode, this is available.

211. Which materials can be printed fast at 2-pass or 4-pass modes?
Number of passes required may vary from one material to another, but the majority will need 4 to 6 passes.

PRINTHEAD Positioning

212. Are the printheads in a straight row, or staggered?
Printheads are arranged in a straight row but are offset to the next by one pixel to create a 200dpi system.

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.

213. Do you raise the heads manually, with click stops, or motorized?
Printhead carriage height is adjusted by a handle found at the right end. Although height adjustment is manual, it has a digital counter. Head height is a double entry system. The operator sets the head height for a given substrate, and then must tell the software the media thickness. If the head height and the s/w value do not match, the software will prevent printing.

214. How complex is the procedure to align the printheads?
Head alignment is software-based. It takes about 5 minutes.

The printheads are located in a straight row.

215. Is there an alarm system to stop the head from hitting substrate if head is not high enough?
No (but see answer two questions above).

216. Can you vary the gap (the distance from the printhead to the media, which is the distance the ink droplets must fly?
2 mm is the ideal, but you can vary this since many materials are irregular.

217. How is the nozzle plate protected? Is it recessed?
It is recessed.

PRINTHEAD: Associated Features

218. Is ink heated in a buffer or elsewhere before arriving near the printhead?
Ink is preheated in a buffer and again at head.

219. Is there a heater associated with each printhead?
Heat from within head.

220. Or is the entire plate heated and thereby some heat gets to the heads?
Heating the metal plate that holds the nozzle-plate area of the printheads as a group (the base of the printhead carriage so to speak) is a cheap way that early Chinese printers did their heating. I don't know of any serious UV-curable inkjet printer manufacturer outside China that uses a heated plate to heat their ink (but with 45 manufacturers, there are always surprises).

221. What is the firing frequency (voltage) of the printheads (in KHz)?
17 kHz is most stable. Spectra (Dimatix) web site list a firing frequency of up to 20kHz.

222. Can the firing frequency be varied by the end-user?
No, but the carriage speed can be changed. Printhead voltage is best changed only by a service engineer.

223. What is the effect of changing the firing frequency of the heads?
It is possible by engineers, but not advisable for end-users because changing the firing frequency can cause problems.

224. Is the negative pressure user variable?
Yes.

225. Are there problems of air getting into the system?
No, not normally.

226. How is air eliminated from the ink lines or from the printheads?
The operator has two choices:

1. Suction of printheads by the service station (best option)

2. Purging printheads (does work, but it is not as effective as sucking)

PRINTHEAD Life Expectancy

227. What is true life expectancy of this print head? Is the printhead considered a consumable?
Printheads are considered a consumable. They are covered by the warranty for 12 months or 24 liters of ink, whichever happens first.

228. How many nozzles have to be out before the manufacturer will replace the head under warranty?
About 7 to 10. Unless nozzles are next to each other.

229. How often can you expect head strikes? What causes them? Who will replace the printheads and at whose cost?
If you have a hard head strike (against the edge of a board), this will drive cured or curable ink up inside the nozzle. So when this happens you must flush immediately or that nozzle will become permanently blocked.

Fabrics are especially likely to produce issues with the printheads because of the fuzzy material that sticks up above the surface of most fabrics.

230. How can head strikes be avoided?
Experience with every material is a safe way to avoid head strikes.

231. What else, besides a head strike, can cause a head to fail prematurely?
If too much sunlight enters up into nozzle plate, and if you never clean your filters.

232. Is the printhead user installable?
Yes. It is advisable that you use a static strap.

233. Where can you send the printheads to be refurbished?
Heads should be sent to LexJet for refurbishing. Then the printheads go to the ink manufacturer to have the heads refurbished. "Never had a head that could not be resurrected."

SUBSTRATES

234. What sizes of material can be printed on?
Rigid materials can be up to 96 inches (2.4 meters) in length, by 72" in width (1.83 m).

235. What is the difference between media width and actual print width?
We have this entry because some printers are called "3.2" because they accept substrates that are 3.2 wide, but the printer can actually print only 3.1 meters. In such a case the model name is misleading (and incorrect in a sense). I have even seen some model designations claiming 3.3 when they only hold media 3.2 meters. So there is a bit of misleading advertising out there.

Print width	Material width	Claimed by how the model is named
72"	72" and a half	The model designation us 72", so is honest.

So the name designation for the Legend is honest.

236. What about edge-to-edge printing (borderless)?
You can print up to the border on three sides: leading edge, right and left. If you need to print on the fourth side you can add an accessory piece at that position.

237. Can you adjust the rate of media feed?
It is not recommended that the user simply adjust the media feed rate. You set this distance (the distance the media is moved between passes) by a simple target.

On some printers, if you have banding lines caused by media feed that is slightly off, you may need to adjust the rate of media feed. This is not always the fault of the printer but a result of the fact that each different kind of material feeds slightly differently.

238. Can you adjust carriage speed?
The operator can´t directly set the speed of carriage, but it is modified by other decisions.

Samples of substrates that can be printed on the Lex Jet Legend 72HUV printer.

LOADING MEDIA

239. If roll-to-roll, what core diameter(s) will this printer accept?
2" and 3". 6" core adapter is available upon request.

240. How about maximum roll diameter or weight?
Maximum roll diameter is 13.5"
Maximum roll weight is 250 lbs

241. What thickness can this printer handle?
Up to 1 inch (2.54 cm)

242. Can you measure the height of the material with a sensor, or is it manual?
What you really want to measure is the printhead gap height: the space (gap) between the top of the material and the nozzle plate (the "printhead").

243. Is roll-fed media loaded from the rear, top, or front?
Roll-to-roll is fed from the rear in most UV hybrid printers.

Loading and preparing the roll-fed media for printing.

244. If you have to load a really long roll, are there clamps or any other system to allow you to secure the first portion so the first portion won't undo itself while you are several meters away trying to load the other end?
The Durst Rho 351R has clamps so if only one person is available to load a long roll, he can clamp down the first portions that he feeds up and over into the platen area while he is still working on the other end of the roll to get that up and into the roll-feeding system.

245. What is the media path?
For rigid materials, you lay board flat on back table, disengage pinch rollers with back lever, with vacuum turned on, and insert the board into the printer until both media sensors are on. Adjust pinch roller pressure. Output will come off at the front.

For roll-fed, media goes from the feeding roller down to the back roller bar, goes up into the printer, to the platen area. After being printed on, comes off at the front and down to the front roller bar from where it goes to the take-up roller bar.

246. Can you manually sheet-feed media? Does it feed easily?
To some degree, feeding rigid media is done manually.

SUBSTRATES, Materials, Applications, and Issues

247. What materials does the manufacturer list?
The Legend 72HUV brochure mentions this printer handles a great variety of uncoated materials up to 1" in thickness. These are the materials listed in the brochure.

Vinyl	Dibond	Polyester film
Sintra	Coroplast	Polycarbonate film
Backlit film	Aluminium	Acrylic
MDO	Plywood	PETG
Polystyrene	Foam board	

The material that was used for my test prints was Kommabrite (PVC from Kömmerling). The tech support people added the comment that "This material is comparable to Sintra but the white point and adhesion of Kommabrite is better; sheet to sheet the quality is consistent, and in general the quality is good."

248. What materials can this printer print on perfectly?
DreamScape is another material talked about. This is a wallpaper material. The DreamScape company sponsored a contest for "best mural".

249. What materials can this printer print on okay?
It helps if the material is clean, homogeneous surface, and should all be the same thickness.

250. What materials can this printer print on sort of okay, but where you have to overcome problems?
"Celtek is not as even (in thickness) nor as consistent as is Kommabrite." Although Sintra is listed in the brochure, you need to learn from experience whether batch to batch it is consistent quality, or not.

Magnetic material quality and printability varies by manufacturer. Some is good, other is not as good.

251. Can you print on mirrors?
Yes.

252. What exotic or atypical materials can you print on?
There is an impressive portfolio of applications. Indeed there is a separate FLAAR Report on applications for the LexJet printer.

253. Heat concerns: will the heat generated by the UV curing lamps cause adverse effects to some delicate forms of heat-sensitive media? Which materials might curl, distort or discolor from the heat?
Heat sensitive materials would include polyethylene, polypropylene, shrink-wrap, very thin and thermal sensitive papers, plastic coated cartons, PVC and aluminum foil (www.dotprint.com/fgen/prod1297.htm).

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

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

You can in effect lower the heat that reaches the material by raising the entire printhead carriage. However this results in noticeably less quality (because the ink is flying through the air a longer distance while the material is moving away from it). You can also set the printhead carriage to move further away from the printing area at the end of each pass (in those cases that the media is less than the maximum and in those cases where these settings are facilitated by the printer design and firmware).

254. What about build up of static electricity? What kind of materials cause this? Do some materials generate static electricity which cause the media to attract ink in areas not supposed to be printed on. How is it manifested?
You do need to be aware of how to prevent static electricity build up:
- No carpets or rugs on the floor. Indeed you should consider anti-static tiles or carpet.
- Use a humidifier during winter months to avoid dryness
- Learn which media are susceptible to gathering a static charge.
- Consider a printer that has specific anti-static features:
    - Grounding
    - Static bar(s).
Most printer reps suggest this is more an environmental issue than a printer or ink issue. They say you can't have carpet and you must maintain a high humidity. They admit that the static electricity situation varies depending on each site's situation.

Nonetheless, some UV printers already have anti-static systems carefully built into their printers. When these work it documents that the investment is well spent. However if the low price of your printer is in part because there is no on-board static system, and if you indeed have a static issue, the natural question is why, since this is such a well-known issue, did your brand not have an anti-static system or if so, why does it not work satisfactorily.

The Legend 72HUV is grounded, and this is a start. Static will also depend on which materials you are working with, how they are handled, and the humidity level in your work place.

255. What happens in very dry weather (low humidity), especially in winter with central heating?
During dry periods (with low humidity) static problems may increase. With a high static charge (such as with PVC materials), the ink is attracted to charged areas of the material. This results in overspray (ink laydown in unintended areas). Dust can be a problem in places and seasons with low humidity. This is one of several reasons why you should have humidity control in your printshop, to allow maintaining proper humidity level for optimum performance of your printer.

SUBSTRATES: Cleaning, Priming, Preparation

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

This will depend on the material, but generally yes. The need to clean incoming materials is typical of any printer. Some materials have more detritus or dust or issues than other materials. And some suppliers offer better materials than others.

257. Do you use lacquer cleaner or anything besides ISP alcohol?

90% IPA is the best. Although, operators used to use Windex frequently.

258. How often is pre-treatment required, either receptor coating or other special surface treatment to the material to be printed?

Latex floor primer has been tried but "we found very few actually worked" Jasco adhesive primer works 15% of the times. Many substances have been tested but only few worked.

Cleaning the substrate before using it for printing.

In rare instances you made need a pre-coating primer.

259. Which substrates must be or ought to be prepared before printing by being corona treated? Corona treatment is to improve surface tension to promote adhesion.

Corona treatment may help on some materials if you do the treatment within a few hours or day or so before printing. Otherwise the corona treatment wears out after a while, so has to be refreshed before printing to be effective. So buying pre-treated material is only a good idea if it is fresh (but you have no way to know how long the material was in a warehouse before reaching your shop).

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

Liquid lamination gives depth with better appearance, but lamination itself is not needed.

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

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

SUBSTRATES: General Concerns

261. Although this printer "prints on almost all materials," what is the adhesion rate with most materials? Does the ink easily scratch off certain materials?

Realize that all statements must be judged based on how long the ink has been on the material, and the surface nature of the material. Not all fluted plastic material is the same; and six months later the adhesion could theoretically be different (based on conditions of display and the nature of the surface of the material).

Adhesion may be difficult on polypropylene and Lexan. Some UV ink does not work well on Coroplast, or prints well but begins to fall off after several months.

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

The "board guides" will help to some degree to avoid skew.

263. What other problems in feeding exist? For heavy material? For light material?

Avoid thin, non-impact polystyrene, as it may melt.

Just realize that no transport belt on any combo-style design can feed all materials with the same precision. Some materials will go through okay; others will skip or stutter, and some may skew. This also happens on expensive VUTEk 200/600 transport belts.

And what feeds well during a test may react differently when you are in full production day after day (when the belt gets worn, and a bit out of kilter).

The worst cases of skew that we have heard of are from the GRAPO Octopus and from the DuPont Cromaprint 22uv.

264. How well can this machine handle warped substrates? Obviously you don't deliberately use warped material, but out of a shipment, at least a few sheets end up with some warp anyway. On the subject of substrates, you will also have to ask your supplier of printing material: "Can substrate suppliers guarantee their material is all the same identical thickness and surface consistency? If not, the print quality will vary depending on how close each sheet is to the expected specifications.

Construction material from places such as Home Depot is not originally intended for printing. Although I have myself bought materials from Home Depot and printed on them successfully, for some materials it might be better to get graphics-type material. So, yes, you can print directly on raw construction material, but just realize that it is not always perfectly flat. You will need to test each kind of material from Lowes or Home Depot to see how well it prints in your printer.

265. How much acclimatization time is needed for the substrates?

If media is too cold, it will "sweat" once it is put under the UV lights.

WHAT IS THE INTENDED MARKET FOR THIS PRINTER?

266. What is the market that the manufacturer has designed this printer for?

Originally it was only signage, but then it went upscale because the same printer is useful for many niche applications too.

APPLICATIONS

267. Can you print fine art photos, giclee, or décor?
Yes.

268. Can you print on textiles or fabrics? How do you handle the ink that gets through the weave?
Not on absorbent fabrics such as textiles. If you are considering to print on textiles, hand-made textiles are better. There are some textile media brands that don´t absorb ink, such as 3P and Glen Raven.

You can increase ink saturation by 20% in the printer software, which works better on textiles.

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.

269. To print backlit can you set a mode for double-density?
No.

Giclee sample printed on the LexJet Legend 72HUV printer.

INK

270. Is there a special ink for flexible material, and another ink for rigid material? What other inksets are available? Is there any choice in inks?
Not currently, but testing flexible ink is in process. In the meantime, the ink that is used is a dual-purpose ink: that prints on rigid material and also on flexible roll-to-roll materials.

271. Is an extrudable or thermal-formable ink available from the printer manufacturer?
At present only Mimaki and Gandinnovations offer a special heat-formable UV-cured ink. For some other printers you can buy after-market heat-formable inks.

272. How many colors are used to produce output - four, six, or eight?
Four. Traditional CMYK

273. What is shelf life of the ink (CMYK)?
Shelf life is listed as 24 months, but it is best if used before 12 months.

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. But LexJet and DEC would not tend to do this; their ink has the date on which it was produced.

274. What company makes the inks? Choices include DuPont, Jetrion (now InkWare/VUTEk), Hexion, Sericol, Sun, Triangle, KonicaMinolta, Toyo, Tetenal and several others.
Triangle ink; this is the same source that provided excellent UV-curable ink to DuPont.

275. Does the printer manufacturer have its own ink chemists on staff?
Yes, Dr. Ray Work.

CMYK inks.

Durst, Gandinnovations, HP and comparable large printer manufacturers have their own ink chemists (even when they don't necessarily manufacture their own ink).

276. Where are the printer's ink containers located? Front, back, or sides?
Front and back at the left end.
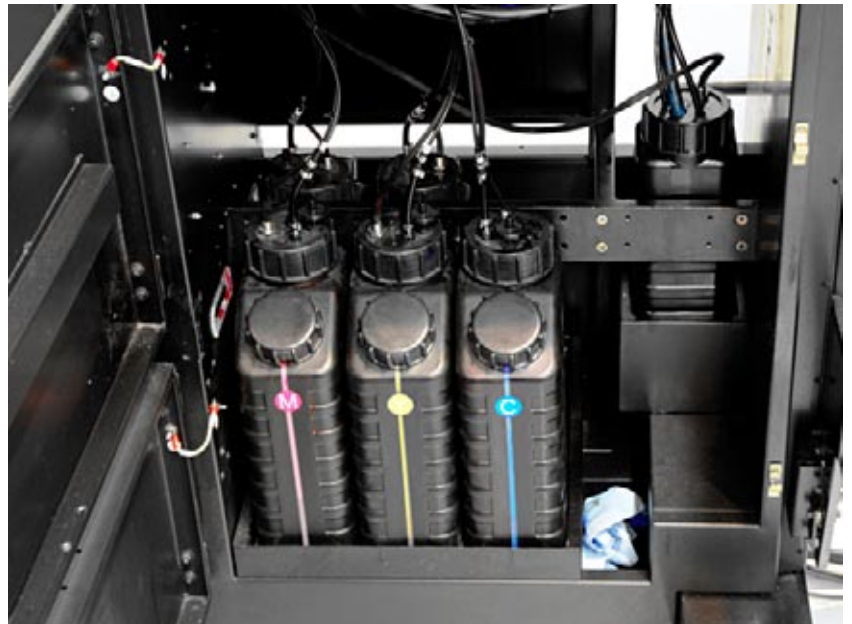
INK: White & Varnish

277. Is white ink available?
No.

INK Cost

278. Does the refill container of ink come in cartridge, bottles or bulk? How large are the ink containers for this re-placement 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. No currently functioning UV printer uses Epson printheads: one Eastech printer tried, but it is not widely used.

The 72HUV ink comes in one-liter bottles.

279. 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.

The ink for the 72HUV is $225 per liter. As an additional comment on ink costs, if your printer system (such as Mimaki JF-1631) or if your printheads need to spit ink frequently when not printing (rumored to be an issue with Seiko heads), then you waste considerable quantities of ink on those kinds of printers. So far I have not heard of issues of excessive ink waste with the Legend 72HUV.

UV Curable pigmented piezo inkjet ink package.
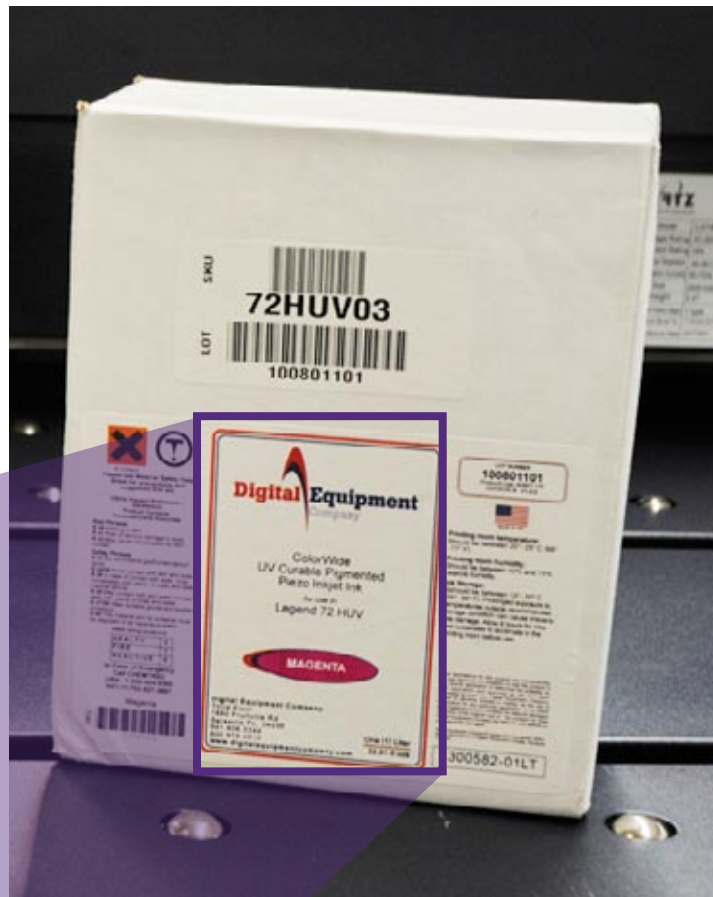
280. Where is waste ink collected? In a tray? In a bottle?
From drip tray via a tube to a waste ink bottle.

281.How much ink does the waste ink container hold?
3 liters.

282. How much of this is ink, and how much is solvent flush?
Depends on the customer. Most is monomer liquid, about 2/3rds is liquid and 1/3rd is ink.

283. How often does the waste container need to be emptied?
Depends on how often the printer is used, but generally once every 3 to 4 weeks.

284. Do you have to drain an on-board container manually? Or just remove one bottle and place an empty bottle in its place?
You empty the waste bottle and return empty bottle back in the printer. Be aware that the User's Guide strongly recommends that you know your city's regulations concerning disposal of hazardous waste material.

DEC has set up national hazardous waste disposal companies with waste info so that for customers who are new to this, contracting a hazardous waste disposal company is easy.

285. How do you know when the waste container is full?
There is a Full waste tank sensor that activates an audible alarm.

286. How can you see the remaining ink level? ? Do you have to ask to see the ink mode, or is the ink status available at all times?
This information is displayed by the software. It is not always visible. It shows the level of all inks, the level of flush liquid and waste bottle status, all at once.

287. Is there an out-of-ink alarm? Is there a warning before actually being out of ink?
There is an audible alarm.

288. What if the operator is out of the room? Does the printer stop?
No, printer does not know by itself to stop, but most people would not try to run a UV printer unattended overnight.

289. Does the printer send an e-mail message (a nice touch if the printer is operating unattended at night)?
No.

290. Can this printer use after-market ink? If yes, what are pros and cons? If no, why is no after-market ink available or widely utilized?
Yes, there is nothing built in to prevent use of other ink, other than common sense. But using an after-market ink voids the head warranty.

291. What kind of protective devices are on the ink system to keep you from using after-market ink?
None. But, as mentioned above, using a third-party UV ink voids the head warranty.

292. Do you have to upgrade software every month or so to use ink to foil being able to use after-market ink?
No.

INK: Supply System, Tubing, Filters, etc

293. How is new ink added? Pouring into the on-board container? Switching the container to the new ink container?
You pour new ink into the containers of the printer.

294. How do you avoid building up old ink inside a large container?
Every 6 months you should clean ink containers to get rid of the old ink that might gel.

295. What is the situation with the ink gelling?
Most issues should be caught by filters.

Ink gels from heat; not only from UV light (since in theory the inside of the printer will have black ink lines so no UV light can reach the ink). But overall heat will cause UV ink to gel. But if you have some circulation within the tank and if the ink is far from the heat, gellation will not be as much an issue.

296. Is there an issue with "ink starvation?"
No. There is a low-ink alarm.

"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.

297. Can the end-user vary the printhead temperature, or is the temperature fixed?
It is not advised to change the printhead (ink) temperature arbitrarily. However in certain situations, a sophisticated end-user, with a high level of knowledge of the overall ink chemistry, UV-curing situation, and experience in the ramifications of varying the factory-set temperature, then changing the temperature could be considered.

298. How long does it take to heat the ink in the morning at startup?
You need 5 minutes, but it is better if you allow a 10 minute span.

299. Has any misting or spray been reported? What about ink inside the machine parts?
Most misted ink is pulled out by the vent system.

Just ask any ink chemist about ink misting; then ask most sales reps. Most people in a typical booth are in a state of denial, or do not fully understand the concept of misting.

Most safety instructions do not mention the potential of the UV ink misting during printing. Some chemists have told me that there is no way to totally prevent all misting since you are generating x-million drops a second from a rapidly accelerating carriage. Misting is inevitable. The most misting that I have seen so far was inside an Infiniti UV printer: the entire surface of the inside (platen, rollers, etc) was totally covered with misted ink). The second most amount of ink misting that I have seen was in a ColorSpan 72UV X. But many other printers mist as well. You can check simply by putting a white swab or white cloth or white paper in a fixed location inside the printer (under the hood). Check it every week or so to see how much misted ink has settled on it.

This is the amount of ink that you may be breathing if the workplace is not adequately ventilated. For the Legend 72HUV printer most misted ink should be pulled out of the gantry area by the vent system.

INK: Longevity

300. What about longevity indoors: where people or objects may scratch, smudge, or rub against the printed surface?
There is currently, neither in Europe nor the US, any standard tests for determining longevity of UV ink.

301. What is the longevity outdoors? What about in the full sun in direct sunlight?
In some cases the ink may last longer than the material on which it is printed.

302. What about solvents such as cleaning solvents? Do they mar, dull, or wash away the ink or change the surface quality, especially on vehicle wrap?
- Ammonia (in Windex and comparable cleaning liquids). Not serious issue.
- Acetone (this needs to be tested; results not yet available)
- Cleaning alcohol, Not serious issue.
- Gasoline, never tried.
- Soap and water with sponge, not considered an issue.
- Soap and water with a broom (frequently used to clean vehicle wraps in Latin America, for example) not considered an issue.
- Scotch-tape pull-off test. Scratch-and-pull-off test is not an issue, within reason. If you use a hard metal tool you can scratch any ink off every surface.

Ammonia, cleaning alcohol, Soap/water with sponge and soap/water with broom have been tried and presented no serious problems.

Gasoline has never been tried and reaction to acetone is also not known.

INK Color Gamut

303. Which colors print best?
The colors on a Macbeth Color Checker look good. Hair, skin and some greens look excellent. As soon as it is possible to undertake a site-visit case study we will provide more description on the color gamut.

THE UV CURING LAMPS

304. How many different sets of lamps are there? Is there pinning first and then curing later?
95% of UV-curable printers have only curing UV lamps. Only the Inca Spyder 150 and a few other innovative machines have a pinning lamp before the curing lamp.

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

Virtually all UV printers use mercury arc UV lamps. Only NUR and a few others use microwave UV lamps. Pulsed Xenon lamps have failed the few times they were tried (an early VUTEk UV printer circa 2000-2001; a cheap Oce Arizona 60uv printer). LED lamps are now being tried in several UV printers, such as by Sun LLC (in Russia). The Gerber Solara ion uses a rare type of long UV lamp that is not used by any other wide-format inkjet printer manufacturer.

306. How many watts are the lamps?
140 watts/cm. Each bulb is 2 inches long.

307. What wave length do the lamps cover?
UVA, UVB, UVC.

308. What is warm up time?
4 minutes.

The LexJet Legend 72HUV uses the Continuous Mercury arc lamps.

309. How long can the lamps stay on before they automatically shut off?
The lamps will turn off if the printer is unattended for 30 minutes.

310. What brand of lamp is used?
It is the tradition in China to use local UV lamps and make the housing themselves.

The NUR Expedio Inspiration uses Nordson microwave technology. Gandinnovations uses Dr Honle, but these are traditional mercury arc, not microwave. Mid-range and entry-level UV-curable printers tend to use UV mercury arc UV lamps from Integration Technology.

311. How many lamps does the printer use?
Two lamps.
Two is the usual number of lamps. Some cheap Chinese printers use only one lamp. Mimaki uses one lamp on several of their

narrow-format UV printers to avoid the lawnmower effect that is caused by bi-directional printing (bi-directional print requires two lamps, one for each direction of ink laydown by the printer carriage).

The Agfa :Anapurna 100 (a printer that was never finished due to being too complex), I believe had three lamps. The Lüscher JetPrint, due to its über-dimensional size, may also have needed more than two lamps (whatever it had did not function fully adequately).
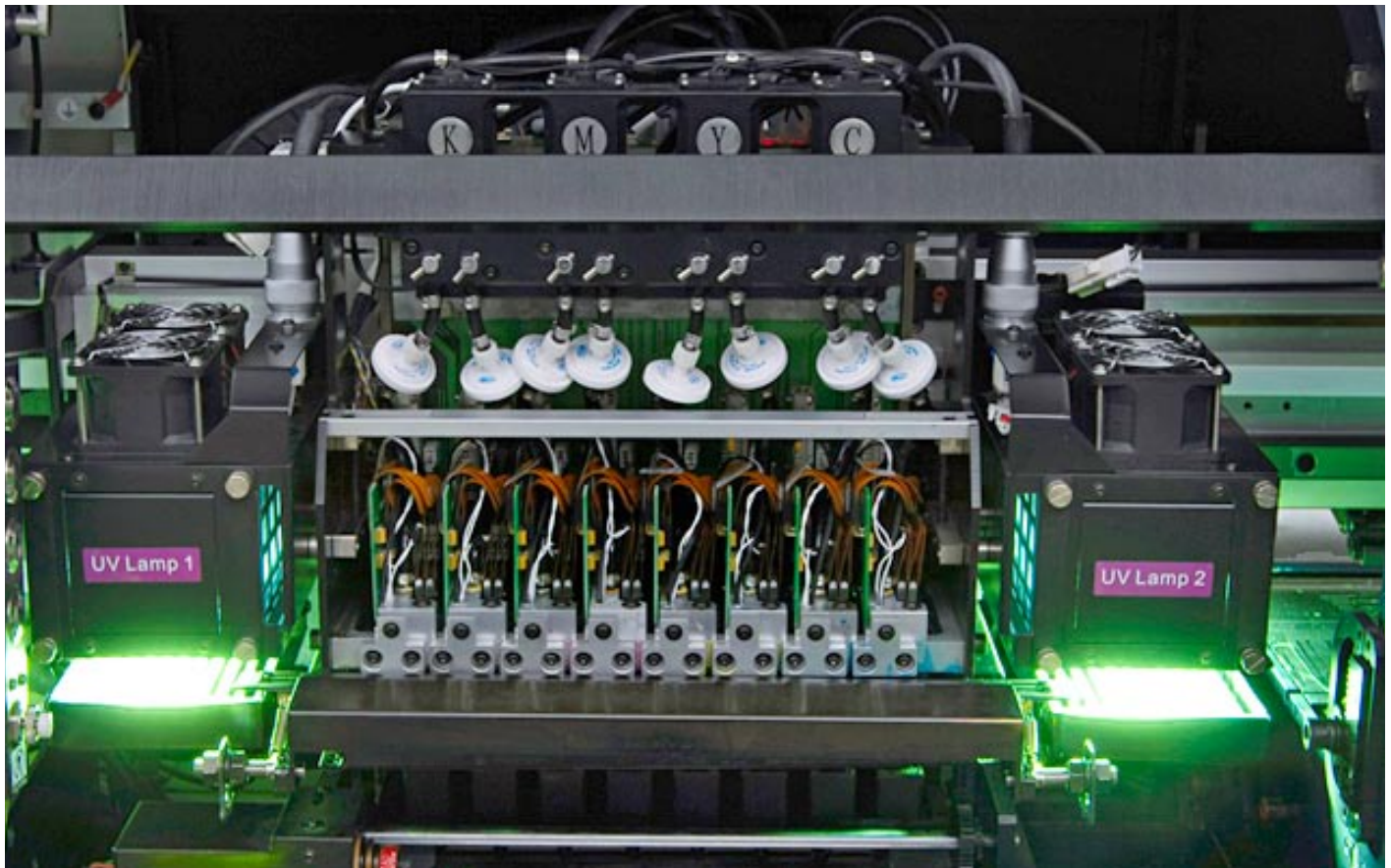
This printer uses two UV lamps.

312. Can you have one lamp on one setting and the other lamp on another setting? Or do both lamps have to be on the identical setting?
You could have lamps on different settings if you really wanted to.

313. What shuts the lamps off? For example, after so many minutes of not being used; or if they overheat?
The lamps will also go off if the operator opens the front door during printing. On most entry-level printers the lamps will shut off after a set period of not printing.

This is a crucial question, and one seldom asked elsewhere: if your UV lamps need to be turned off after the printer being unused for 5 to 10 minutes, then your lamps' life gets used up quickly. Each strike (turning the lamp off and on one time) can lower the life of the lamp by one or two hours. So ideally you want a kind of UV lamp system where the lamps can stay on as long as possible to avoid having to turn them off and on all day long.

Another downside of having to turn the lamps off is that you then have to let them cool down, and then have to let them heat up again.

On this model, lamps go to "Low" if not printing for 5 minutes. If not printing for 30 minutes, lamps turn off.
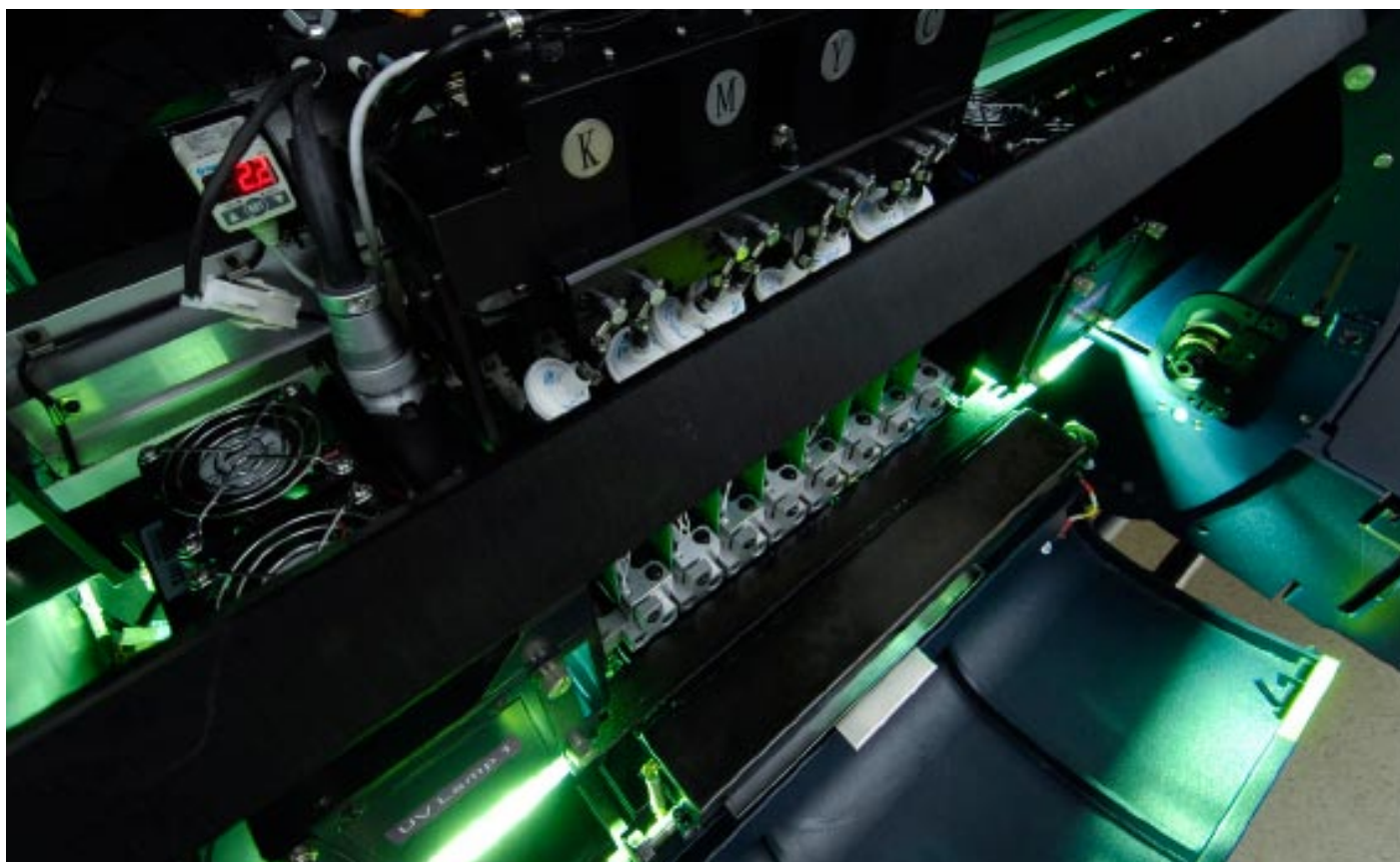
314. How long does the lamp last, in terms of hours of operation?
500 hours. You have to keep in mind the consequences of not replacing the lamps at the right time. At 1000 hours you loose cure on coroplast.

315. How many hours are used up by each "strike" (by each time you turn the lamps on)?
GCC is one of the few companies that clearly, specifically, and openly mentions how many hours are wasted by each strike: namely three hours.

316. Is the lamp fan filter a user-replaceable item? How often should this be cleaned or replaced?
If the filter gets clogged with dust then it is less efficient in keeping down heat. Heat build-up is not good for the overall carriage area. Fortunately the lamp filters on the 72HUV are easily replaced by the customer and should be changed when the bulbs are changed.

317. How do you keep track of lamp-hours?
There is an hour meter on the UV power supply.

318. How much does each replacement lamp cost?
$208 each, $416 for the pair.

319. Can the lamp alone be replaced or does the whole assembly need replacement?
Yes, you can replace just the bulb.

320. What is the true drying (curing) time of the inks used with this set of lamps? What factors influence the true (total) drying time?
No UV ink really cures within seconds. Some colors, depending on how thick the ink is laid down, may cure "instantly." But several factors may result in a cure that takes 24 hours, 48 hours, or weeks. If you set the print mode for "glossy" this reduces the lamp intensity. These prints will outgas for weeks.

UV LAMPS: Cooling

321. Are there shutters?
No.

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

322. How often do the shutters stick?
The shutters on the Gandinnovations printer are pneumatic, so don't stick as often as mechanical shutters. DuPont Cromaprint 22uv printer seems to have issues with its shutters getting stuck (either stuck open or stuck shut). So DuPont had to switch to another solution. We occasionally hear of shutters of other brands of printers sticking as well. Indeed one company said they don't use shutters at all due to the possibility of them not opening or closing. Making them pneumatic resolves many of these issues. Of course one reason for not using shutters is to save cost. Most Chinese printers and low-cost UV printers made in the US and elsewhere may skip shutters.

But it may be safer to have no shutters at all rather than have shutters, then depend on them, and if they fail nonetheless, then the UV lamps can set the printer on fire (as happened with two Grapo printers in Australia). The Grapo printers are made in Europe, not China.

323. How are the lamps cooled? Air? Fans? Water-cooled?
Lamps are cooled with fans.
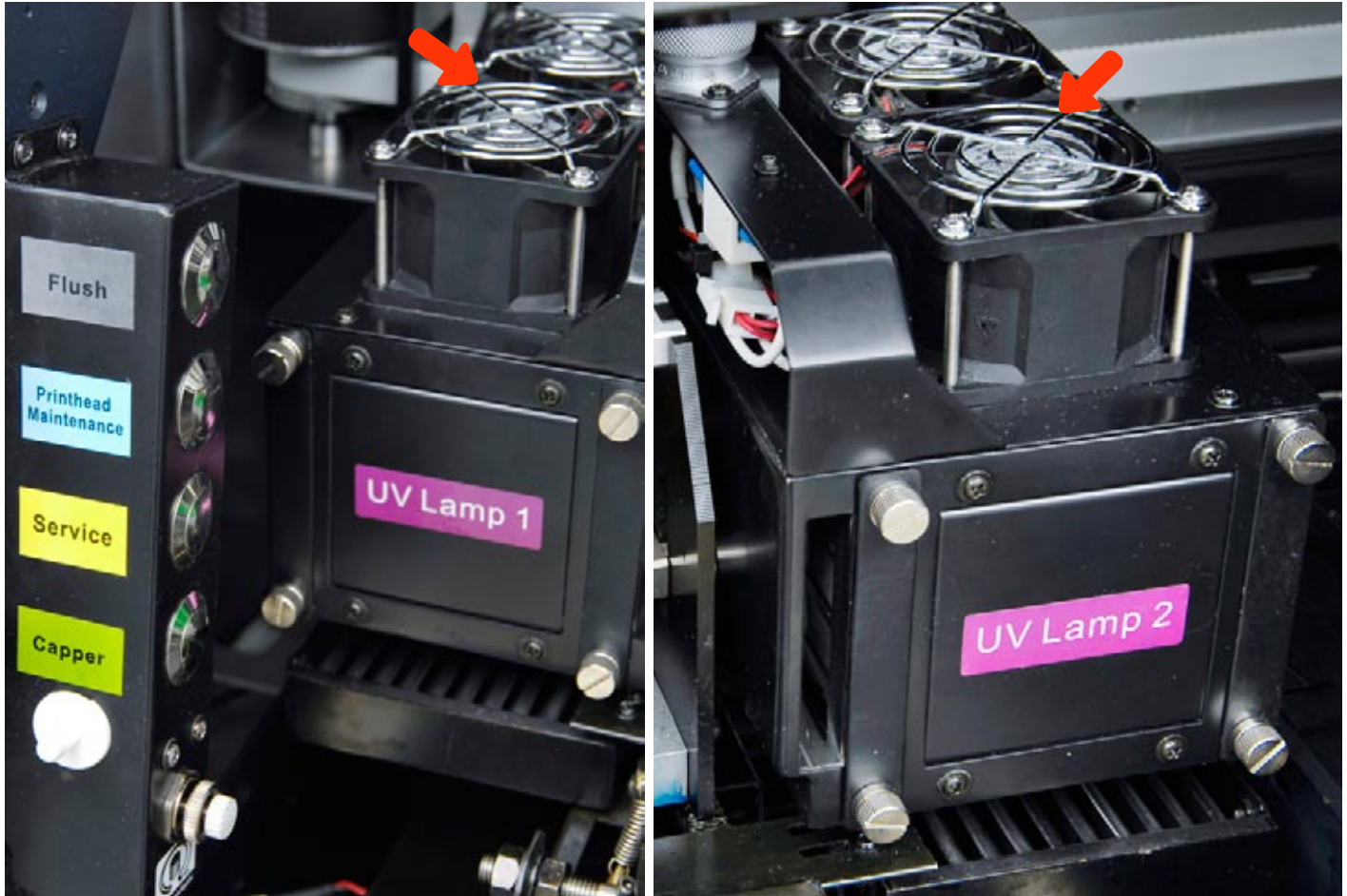
The lamps are cooled with fans located on top of them.

324. How many fans are there per lamp?
Two fans per lamp.

325. How many settings do the lamps have? Or are the fans just Off and On?
Off, Low and High.

326. Or are the UV lamps adjustable automatically based on how hot the lamp area is?
You set the lamps manually, but the system itself will switch from Hi to Low if the system is idle for more than two minutes.

327. Are there fans elsewhere in the printhead carriage area?
No.

328. What other fans are there in the printer, or exhaust ports?
The whole back of the printer has about eight fans. UV power supply has fans, service areas have internal fans.

329. How long does it take to cool the lamps down before you can touch them to change them?
The operator's instructions for the Durst Rho 800 Presto is the first user's manual where I have seen mention of how long you need to let the lamp cool down enough to touch it safely: they recommend one hour.

UV LAMPS: Reflectors

330. What kind of reflectors are used?
Polished aluminum.

RIP SOFTWARE & Printer Software

331. Which RIPs are featured?
Onyx; either PosterShop or ProductionHouse.

332. Does the price of the printer include a RIP?
No.

333. Is a computer and monitor included (to run the RIP)?
A computer and monitor are included to run the printer and simultaneously RIP server.

334. What kind of monitor is included with the printer's computer?
You receive a 19" LCD monitor.

335. Is your printer and/or RIP Pantone certified?
Not the printer, but the RIP is.

COLOR MANAGEMENT FEATURES

336. What color management sensors or measuring tools are on-board?
ColorSpan has color management tools built into its UV printers, but this works fully only if you also purchase their Kodiak RIP software. Otherwise this feature is not yet available on other brands of UV-curing wide-format inkjet printers.

PRODUCTIVITY & ROI (Return on Investment)

337. Can this printer hold up to two or three shifts per day all week?
Yes, 2 shifts a day. This is the first thing I will ask when I do a site-visit case study in a printshop. Even if you yourself won't use this two shifts a day, I would not trust a printer that is so cheap that it fails to print 16 hours a day. So far the printers made by RTZ from late 2007 onward appear to be more reliable than printers made in earlier years.

338. Does this printer have to be turned off to rest between shifts?
No. After a while of not printing, machine will go to idle mode.

ADVERTISING CLAIMS:

339. How often do people return this printer and say they want their money back?
Any time you are seriously thinking of any printer it is essential to learn what the recall or return rate is. In other words: how many printshops return this printer because it is either not what they expected or not what they need.

This does not automatically mean that the printer is bad; it may mean that the printshop had an unrealistic expectation. Sometimes the printshop did not anticipate how much maintenance and care the printer needed in the evening and in the morning.

It is likely that every single brand out there has printers they have had to take back. But you ought to learn how many, and why.

If the manufacturer, distributor or reseller is honest and gives you the actual facts, this is a company to trust.

If they say there have been no returns, this is statistically unlikely (but not impossible).

GENERAL CONSIDERATIONS

340. How many printers of this model are in use; in the USA; in the rest of the world?
It is crucial for a printshop owner, who is making their short list of which printers to consider buying, to know how many printers of each brand have been sold.

COMPARISONS WITH OTHER PRINTERS

341. When people are considering buying this printer, what other printer(s) are they also looking at?
ColorSpan hybrid (now HP) is the only other hybrid that might be competitive, but can't print as wide (only 54"). The Milano hybrid is more expensive and not actively marketed. The new Mimaki hybrid is not finished (the UV lamps don't adequately cure the ink either). The Gerber Solara is not serious competition any more (too slow and has been around too many years to have much that is new or impressive). I would rate the Teckwin hybrid UV printer as a newer competitor that is considerably more sophisticated than the Gerber Solara.

The Raster Printers H700UV is a combo, not a hybrid, but is in a comparable price range (and made by the same factory as the Legend).

342. What features on the other printers may be issues?
The ink pump issues of the ColorSpan hybrid has been fixed. Whether the skewing and media feed issues have been eliminated you can only know if you visit a printshop that has a retrofitted HP-ColorSpan.

SUMMARY: Image Quality Issues: General

343. Is text sharp or fuzzy? What is the smallest text that you can easily read?
Eight point font is good.

344. What about the dot pattern? Is the image grainy (like sand) or is the image smooth as you would expect of a photograph?
Output appears grainy if you view it at close distances. Light tints and flesh tones may be the areas that make the image appear grainy. This is due to the large picoliter drop size. But most signage, especially banners, are not seen close-up, and most shoppers in a mall or at an airport don't look at the signage with a loupe. The benefit of a large picoliter drop size is a bit of extra speed.

345. Can the system produce glossy finish? To what degree is surface glossiness an issue? Can you select glossy or matte or do you get what the system provides and that is all? If you get only one, or the other, which is it you get?
Yes, glossy finish is possible. If you print on uni-directional mode with leading lamp on.

346. Are there issues with gloss differential or bronzing?
No issues have yet been noted.

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

348. What about abrasion (scratch) resistance? How susceptible is the ink to abrasion?
Scratch resistance could be considered as normal. No ink can be non-scratchable on all substances.

Conclusions

Pros

The asset of LexJet is that they know their customer's needs from direct and personal interaction over years. LexJet is one of the largest and most sophisticated dealers I have seen. Now they have been joined by the team that moved from DuPont. This team already knows this printer inside out, from its inception through its improvement over the past two years. These are the experienced service technicians who can provide installation, training, and tech support when and if this is needed in the future.

The company distributing this printer is honest in not claiming that "this printer can print on everything." That claim is silly because printing on something is only the first step. The more pertinent question is, which materials can you print on and have the ink adhere, and adhere without easy abrasion.

A few noticeable beneficial features of merit that I would mention are
• Software gets rid of bi-directional banding.
• There is no banding found in solid blacks (no banding caused by inaccurate mechanical feeding of the material).
• With the entry-level price on this unit your printshop can learn about UV without risking too much capital.
• DEC has gotten rid of counterfeit parts (counterfeit parts are present in most printers made in Asia).
• You get an air scrubber (air purifier) included at no extra cost.
• This printer has a clever auxiliary guide bar system that can be attached onto the flatbed feeding table that attaches to the printer.

What I found as the major asset of LexJet + Digital Equipment Company is that their tech support crew already has years of experience. Let us take but one example (there are several other qualified tech support personnel too). The example here, however, is Russ Brown:
• He is an ISO qualified auditor
• Quality control manager
• Incoming supplies inspection manager
• In charge of quality inspection procedures

He was in charge of implemented manufacturing concepts developed by DuPont and now continued by Digital Equipment Company (LexJet). He has added discipline to the research and development teams (at RTC/Flor in China and in Florida). He has added testing measures.

The User's Guide for this printer is better than most manuals from Asia for several reasons: first, this guide appears to be written in native English; it is not merely translated. Second, the guide is written by a person who obviously has experience with UV-cured inkjet printing.

Downsides

Every printer, even those costing a quarter million dollars, have downsides. Even popular printers such as the Oce Arizona 250 has a long list of issues. Even major brand names such as Mimaki have known issues. And both of these printers cost in the $140,000+ range. So it would be natural for a printer costing under $90,000 to also have features that you have to live with.

If the printer is not printing for only a short period, the UV curing lamps shut off. This is good, because it prevents a fire (two GRAPO UV printers have caught on fire already). But the downside of the UV lamps having to shut down is that they you need to wait until they are cool before starting them up again.

So far, the only aspect I have found is actually not a defect, and not an issue, but it is something that the printshop owner needs to be aware of, namely the ink droplet size. The large picoliter drop size helps speed, because printing speed needs large drops, small drops take more time. This is one of several reasons why the Oce Arizona 250 is so slow: it has small drop size. But the marketing team of LexJet and Digital Equipment Company are open about the large drop size because they recognize that most signage is viewed from a normal viewing distance. At a normal viewing distance for a sign, or a banner, no one will notice the large drop size.

Comments & Suggestions

The air scrubber is an excellent idea, but it makes noise at times, so be sure to put this scrubber in another room, or otherwise shield it from the ears of the printer operator.

It would be recommended for the printer operator to wear safety glasses. I would also suggest that the factory might test for what angles UV light might escape, and cover that angle in future iterations of this printer.

This printer is appropriately directed towards franchise sign printing shops, family operated signage shops, commercial printers, and lithographers (since lithography is gradually becoming outmoded).

Most recently updated September 2008.

First issued July 2008. Updated August 2008.
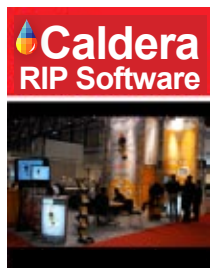
These reports on RIP software and Color Management for serious UV printers are free downloads on all FLAAR web sites
(follow the link to 'free downloads')   http://www.wide-format-printers.net/reviews_reports_evaluations/free_download.php

RIP, COLOR MANAGEMENT, and ICC Color Profiles options

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

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

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

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

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

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

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

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

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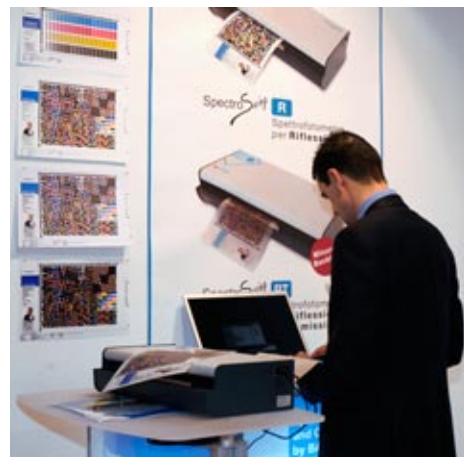
For further information on Caldera
contact Joseph MERGUI
mergui@caldera.fr
If you have questions about color management, if you are in the US you can contact: ImageTech at:
www.ImageTechDigital.com
Mark Spandorf (owner and president),
mark@imagetechdigital.com
or 510 238-8905.
If you are in Europe or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

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

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

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

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

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

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

XY Cutter Options

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

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

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

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

Gerber M Series cutter at ISA '08.

Reality Check

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

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

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

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

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

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

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

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

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

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

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Advisory

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

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

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

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

Equally often, what at first might be blamed on a bad product, often turns out to be a need of more operator experience and training. More often than not, after learning more about the product it becomes possible to produce what it was intended to produce. For this reason it is crucial for the FLAAR team and their university colleagues to interact with the manufacturer's training center and technicians, so we know more about a hardware or software. Our evaluations go through a process of acquiring documentation from a wide range of resources and these naturally include the manufacturer itself. Obviously we take their viewpoints with a grain of salt but often we learn tips that are worthy of being passed along.

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

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

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

But even when we like a product and recommend it, we still can't guarantee or certify any make or model nor its profitability in use because we don't know the conditions under which a printer system might be utilized in someone else's facility. For ink and media, especially after-market third-party ink and media, it is essential that you test it first, under your conditions. We have no way to assure that any ink or media will be acceptable for your specific needs in your specific print shop. As a result, products are described "as is" and without warranties as to performance or merchantability, or of fitness for a particular purpose. Any such statements in our reports or on our web sites or in discussions do not constitute warranties and shall not be relied on by the buyer in deciding whether to purchase and/or use products we discuss because of the diversity of conditions, materials and/or equipment under which these products may be used. Thus please recognize that no warranty of fitness or profitability for a particular purpose is offered.

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent,

eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Our reports are on usability, not on health hazards.

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

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

Results you see at trade shows may not be realistic

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

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

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

Trade show examples tend to be on the absolutely best media. When you attempt to save money and use economy media you will quickly notice that you do not get anywhere near the same results as you saw in the manufacturer's trade show booth, or pictured in their glossy advertisement. Five years ago we noticed Epson was laminating prints to show glossy output because their pigmented inks could not print on actual glossy media. The same equipment, inks, media, and software may not work as well in your facility as we, or you, see it at a trade show. All the more reason to test before you buy; and keep testing before you make your final payment. Your ultimate protection is to use a gold American Express credit card so you can have leverage when you ask for your money back if the product fails.

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

You absolutely need to do print samples with your own images and the kind provided by your clients. Do not rely on the stock photos provided by the printer, ink, media, or RIP manufacturer or reseller. They may be using special images which they know in advance will look fabulous on their printer. Equally well, if you send your sample

images to the dealer, don't be surprised if they come back looking awful. That is because many dealers won't make a serious effort to tweak their machine for your kind of image. They may use fast speed just to get the job done (this will result in low quality). Check with other people in your area, or in the same kind of print business that you do. Don't rely on references from the reseller or manufacturer (you will get their pet locations which may be unrealistically gushy): find someone on your own.

Factors influencing output

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Although we have found several makes and models to work very well in our facilities, how well they work in your facilities may also depend on your local dealer. Some dealers are excellent; others just sell you a box and can't provide much service after the sale. Indeed some low-bid internet sales sources may have no technical backup whatsoever. If you pay low-bid price, you can't realistically expect special maintenance services or tech support later on from any other dealer (they will tell you to return to where you paid for the product). This is why we make an effort to find out which dealers are recommendable.

Obviously there are many other dealers who are also good, but we do not always know them. To protect yourself further, always pay with a level of credit card which allows you to refuse payment if you have end up with a lemon. A Gold American Express card allows you to refuse payment even months after the sale. This card may also extend your warranty agreement in some cases (check first).

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

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

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

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

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

Availability of spare parts may be a significant issue

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

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

Lack of Tech Support Personnel is increasing

The book of sales in the third quarter of 2008 resulted in many tech support problems.

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

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

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

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.

one Epson). Yet we know other users who had better results; maybe ours came down the assembly line on a Monday or Friday afternoon, when workers were not attentive. One costly color management software package was judged "incapable" by two reviewers (one from the university; second was an outside user who had made the mistake of buying this package).

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

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

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

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

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

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

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

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

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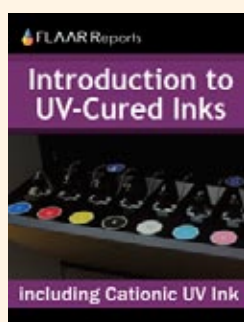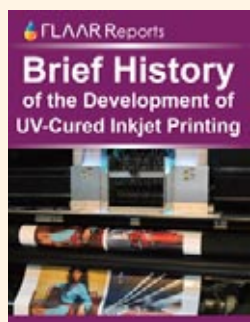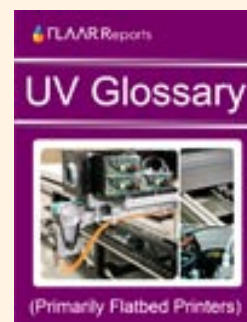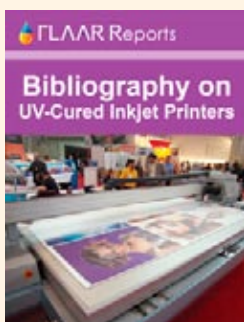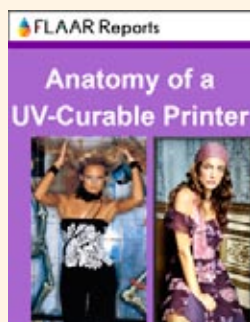
A modest portion of our income comes from our readers who purchase the FLAAR series. All income helps continue our tradition of independent evaluations and reviews of inkjet printers, RIPs, media, and inks.

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

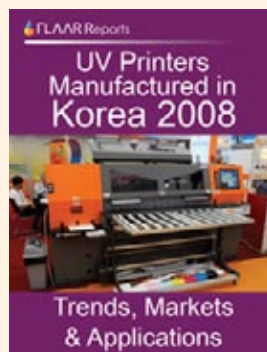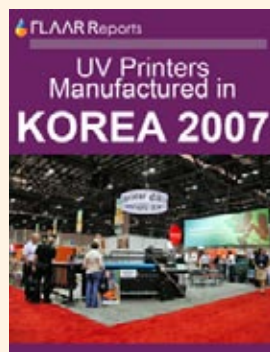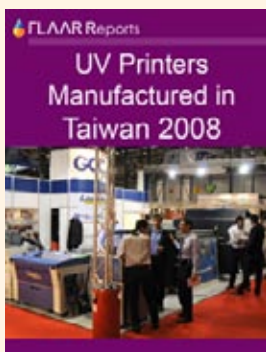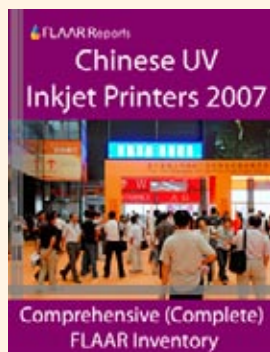Introduction to UV Curable Inkjet Flatbed Printers

FLAAR Reports — Anatomy of a UV-Curable Printer

FLAAR Reports — Bibliography on UV-Cured Inkjet Printers

FLAAR Reports — Classifications of more than 60 UV-Cured Printers

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

FLAAR Reports — UV Glossary (Primarily Flatbed Printers)

FLAAR Reports — Brief History of the Development of UV-Cured Inkjet Printing

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

FLAAR Reports — UV Lamps for flatbed Inkjet Printers

FLAAR Reports — Introduction to UV-Cured Inks including Cationic UV Ink

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

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

FLAAR Reports — Trends in UV Flatbed Printers documented at DRUPA 2008

FLAAR Reports — UV Printers Launches and Exhibits of UV Printers at DRUPA 2008

FLAAR Reports — UV Printers Trends 2008 SGIA '08 PART I

FLAAR Reports — Flatbed & Roll-to-Roll UV Printers SGIA '08 Part II

FLAAR Reports — Chinese-Made UV Flatbed Printers Shanghai '08 Trade Show

FLAAR Reports — UV Printer TRENDS VISCOM ITALY '08

FLAAR Reports — Trends in UV printers at VISCOM Germany 08

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UV Printers Manufactured in China, Korea and Taiwan

Most recent UV Printers