

Entry-Level Combo Printer for Architectural Materials



GCC StellarJET K72UV



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Entry-Level Combo UV-Cured Printer

GCC StellarJET K72UV

INTRODUCTION

Jose Melgar, Technical Writer on UV printers for FLAAR, took notes on this printer for the first time in FESPA Amsterdam.

This report will be updated in the following months as soon as we can inspect the printer at the factory demo room and at a site-visit case study (in a printshop somewhere in the world, preferably in Europe or the Americas). At that future time we will be able to comment on other new features.

Printers manufactured in Japan, Taiwan, and Korea have a good reputation. I have visited the factory of GCC and know the people behind this printer.

It is a notable trend that manufacturers are realizing that a pinch-roller / grit-roller system is not ideal to move a wide range of thick flat materials. A moving transport belt has some advantages, especially at a price below \$100,000.

Introduction by Nicholas Hellmuth

THE BASICS

1. Brand name, model?

GCC StellarJET K72UV,

2. What other printers of other brands are comparable?

The new EFI Rastek H650 shares some features like being in the entry-level price range; both move media with a transport belt, print widths are similar, among other similarities. Also the Dilli Neo Titan and Agfa :Anapurna M printers are comparable, although these two are in the mid-range price (a polite way of saying the Agfa printers are priced noticeably higher).

The GCC K72UV has an advantage in being a second generation on a similar chassis as the 183UV. The new entry level Rastek printer is a first generation and I have not yet been able to inspect the factory in China where it is manufactured.

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

This model is based on the StellarJET 183UVK; the StellarJET K72UV is an upgraded version. Of course there are some differences because the 183UVK model moves media with pinch rollers, and the K72UV moves media with a transport belt. Being the fourth UV printer produced by GCC, the K72UV model receives all the technical experience from the three previous models.

4. If this is a rebranded printer, what features are different than the original printer?

GCC is the original manufacturer.



GCC StellarJET K72UV combo printer at FESPA Amsterdam '09.

5. When and where was this model first introduced?

The first time we had a chance to take notes on this model was at FESPA Digital Europe '09, in Amsterdam, but by then it had already been shown in tradeshows in China and South Korea.

6. Is there enough new on this printer to make it worthwhile buying it if I already have another recent model?

The StellarJET K72UV handles rigid media twice as thick as the StellarJET 183UVK. The measurement of media height is automatic, whereas in the 183UVK, it is manual. Shutters of the UV lamps are automatic—the original model has manual shutters.

This report is going to be updated constantly in the following months, and we will be able to comment on other new features.

7. What is the philosophy behind the development of this printer? What did the manufacturer seek to achieve?

GCC is aiming to reach niche applications like architectural materials, glass, ceramic tiles and others because the sign market is already saturated.

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

The printer is in the last phases of alpha-stage towards beta.

9. List price?

€66,000 for the basic model of four colors.

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

The tables are an optional feature for €4,400. White, light cyan, light magenta and varnish are also optional.

11. 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 2 liters of ink per color.

12. Do you need to provide air pressure for negative pressure for ink in printheads? Do you need to provide compressed air for any other purpose?

You receive an air compressor as part of your machine.

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

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.

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

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

But there is no right or wrong policy (ColorSpan is not “wrong,” they are simply trying to protect newbie's from making a mess of the inside of the printer. In general, the end-user is usually not encouraged to take the printer apart and do repairs on their own. Only later on, when you have considerable experience, and have taken advanced



GCC StellarJET 183UVK hybrid printer. The K72UV is an upgraded version of this printer. The main difference is that the 183UVK moves media with pinch rollers (hybrid mechanism), whereas the K72UV moves media with a transport belt (combo mechanism).

tech support training, would doing your own repairs be realistic. However I have visited many printshops where the printer operator prefers to receive this training precisely so they can do their own repairs. After all, if the manufacturer can train their own tech support person surely a printer operator, who also works with this printer every day all month all year, can also learn how to maintain and repair it (if they have the interest and inclination).

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

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 all over Europe; in the UK, Netherlands, Belgium, France, Germany, Italy, Portugal, Ukraine. Since the end of November 2008 there is a dealer in Lebanon. There are also distributors in the US and in Canada.

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

GCC sales to distributors. The availability financing programs will depend on each dealer.

FEATURES OF THE PRINTER: Vacuum

17. Is there a vacuum function?

Yes, media is held fixed to the surface by a vacuum system.

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

Vacuum is created by one air pump.

19. In how many sections?

There are two vacuum sections with six air channels, so three vacuum channels per section.

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

Yes, you can determine the area of the vacuum manually with a slider. The areas are covered gradually from right to left.

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

You can have the left section off (which is farther from the control area), but you can't have the left section on and the right section off because the vacuum is manually turned on from right to left.



This is the manual slider to turn on/off the areas of vacuum.

22. Just Off and On? Or variable?

The area is variable, but the intensity is the same.

23. Does setting a substrate profile activate a higher or lower vacuum automatically?

No. The vacuum strength is the same for all substrates.

24. Is the vacuum too weak for some materials? Does this mean you have to waste your time and tape materials down to the top of the flatbed table?

With the Mimaki JF-1631, 1610, the Oce Arizona 250, and the Gerber ion it is necessary to put paper or thin foam core material on top of the entire flatbed area where you are not printing. If you don't do this, those vacuum holes will suck open air and there will not be enough vacuum under the piece of material that you need to print on. But I have also seen flatbed printers costing \$300,000 also requiring this, such as Gandinnovations Jeti flatbeds.

With a combo transport belt there is no way to tape down the outside (unused) area. But most normal materials feed through on the transport belt.



Vacuum is created by this air pump. As you can see, the main hose divides in two hoses for the vacuum areas.

STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path

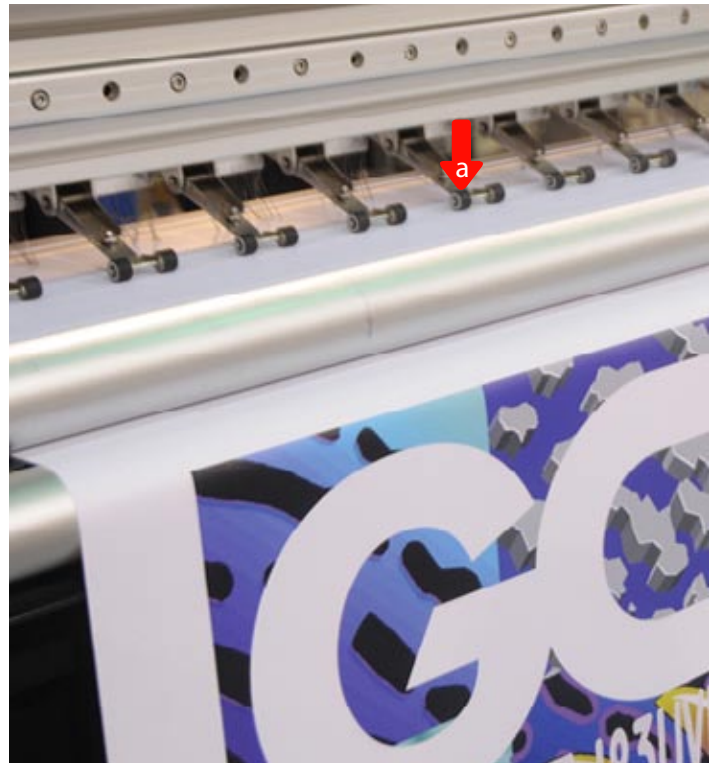
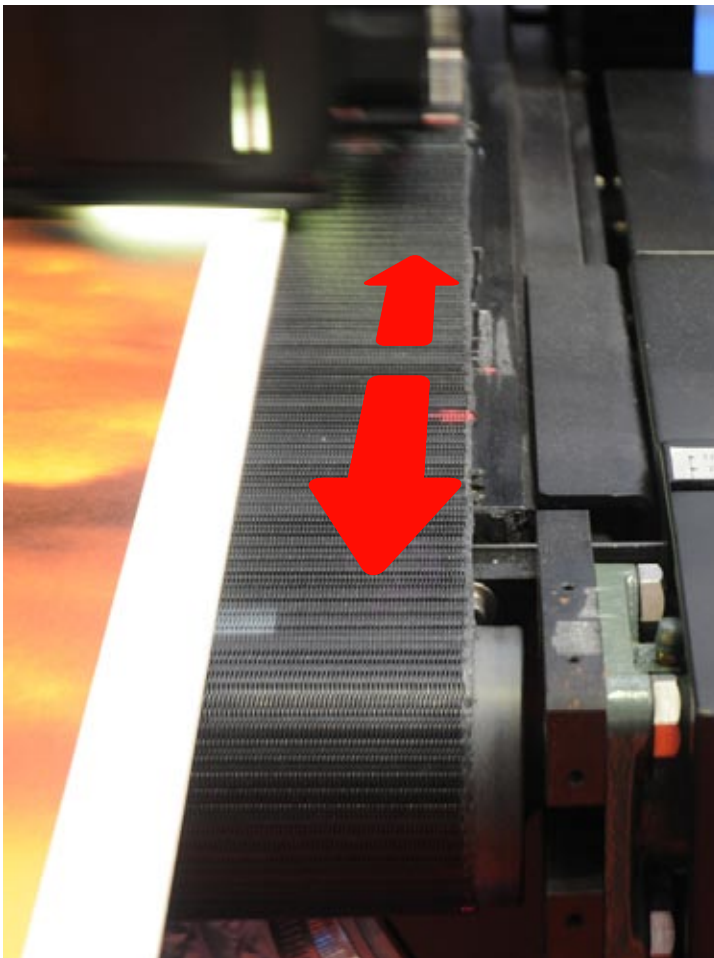
25. Is this a dedicated flatbed with no roll-to-roll capability? Or is this a true flatbed or just add-on feeder platforms at front and back?

This printer is a combo: it prints on both rigid and roll-fed media.

Just realize that the best machine to print on flat material is a dedicated flatbed and the best printer to print on roll-fed is a dedicated roll-to-roll. The advantage of a combo printer is that it can print on both flat and rigid and roll-fed material. But no joint-use printer can print on all materials perfectly: irrespective whether it is a \$80,000 entry level or \$300,000 model.

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

Yes. The StellarJET K72UV moves media with a transport belt.



The StellarJET K72UV (at left) moves media with a transport belt that can be set to move forwards or backwards. The StellarJET 183UVK (right) moves media with pinch rollers (a). One of the reasons why GCC designed this printer with a transport belt was because pinch rollers work acceptably with roll-fed materials and with some rigid boards, but are not the most adequate system to handle small pieces of material like ceramic tiles, etc.

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 designed and built from the ground up to be a UV-curable printer. GCC is a company that started producing wide-format printers in the UV era. Some companies that manufactured wide-format solvent printers began retrofitting their machines adapting UV technology. That is why some aging UV printers are hybrid: a roll-fed system to which engineers added tables to handle rigid boards.

But there haven't been many successful hybrid printers, except for two or three.

STRUCTURE OF THE PRINTER (if a combo style): Transport Belt**28. Describe the transport belt? What material? What manufacturer?**

GCC engineers chose a mesh transport belt—a membrane that is woven on top but also below. This kind of transport belt is also being used by other respected companies. The main advantage is that it allows more adherence of materials to the belt, because the vacuum works in practically all the surface, opposite to the traditional drilled out (with holes) transport belt where the vacuum works only in the area of the hole.

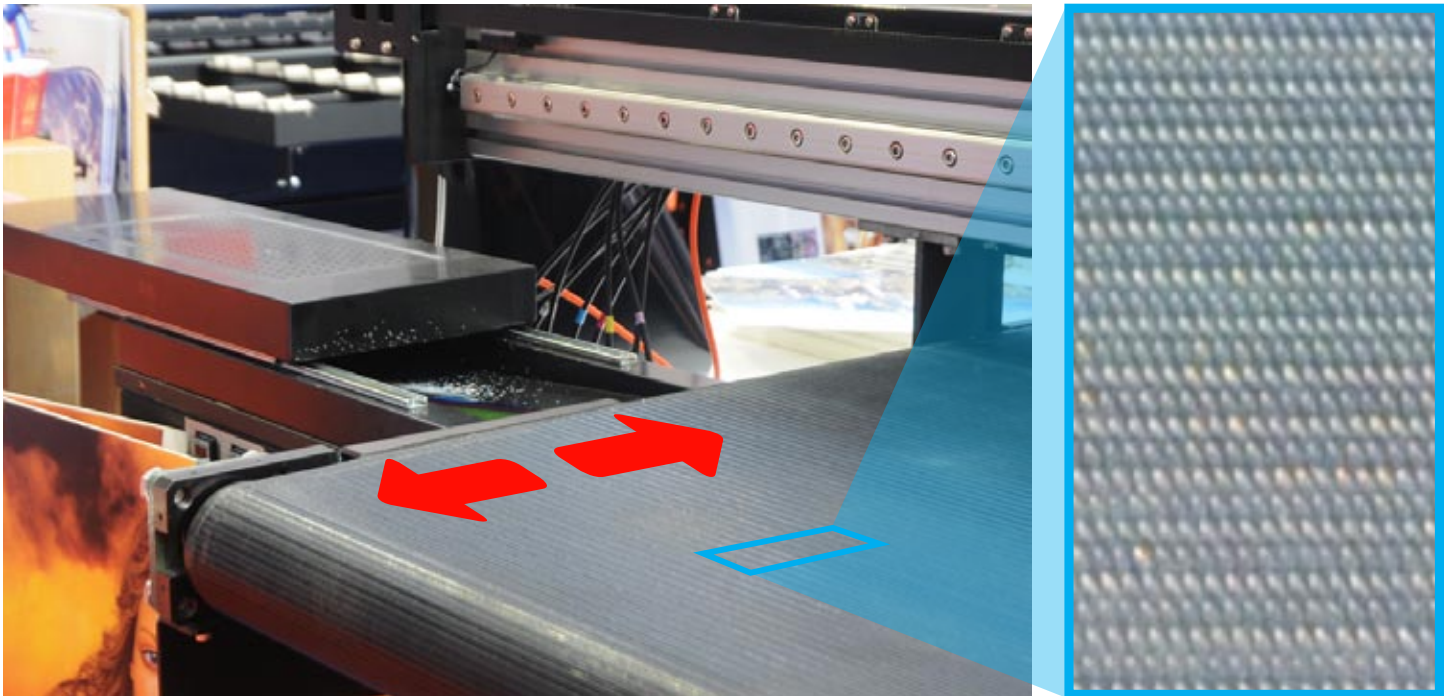
Belts that are solid may track well but may be especially difficult to replace.

29. Size, does the transport belt stick out, at the front? Or at the back?

The transport belt sticks out both at the front and at the back about 20cm from the main chassis.

30. Can the belt move forwards and backwards, or only forwards?

You can tell the transport belt to move backwards or forwards via software. This is a rare, and beneficial feature.



The transport belt is a threaded membrane. This design lets vacuum strength work more uniformly over the area of the substrate.

31. How many rollers control the belt: is the path of the belt horizontal, or triangular?

There are two rollers, one of which is the drive roller.

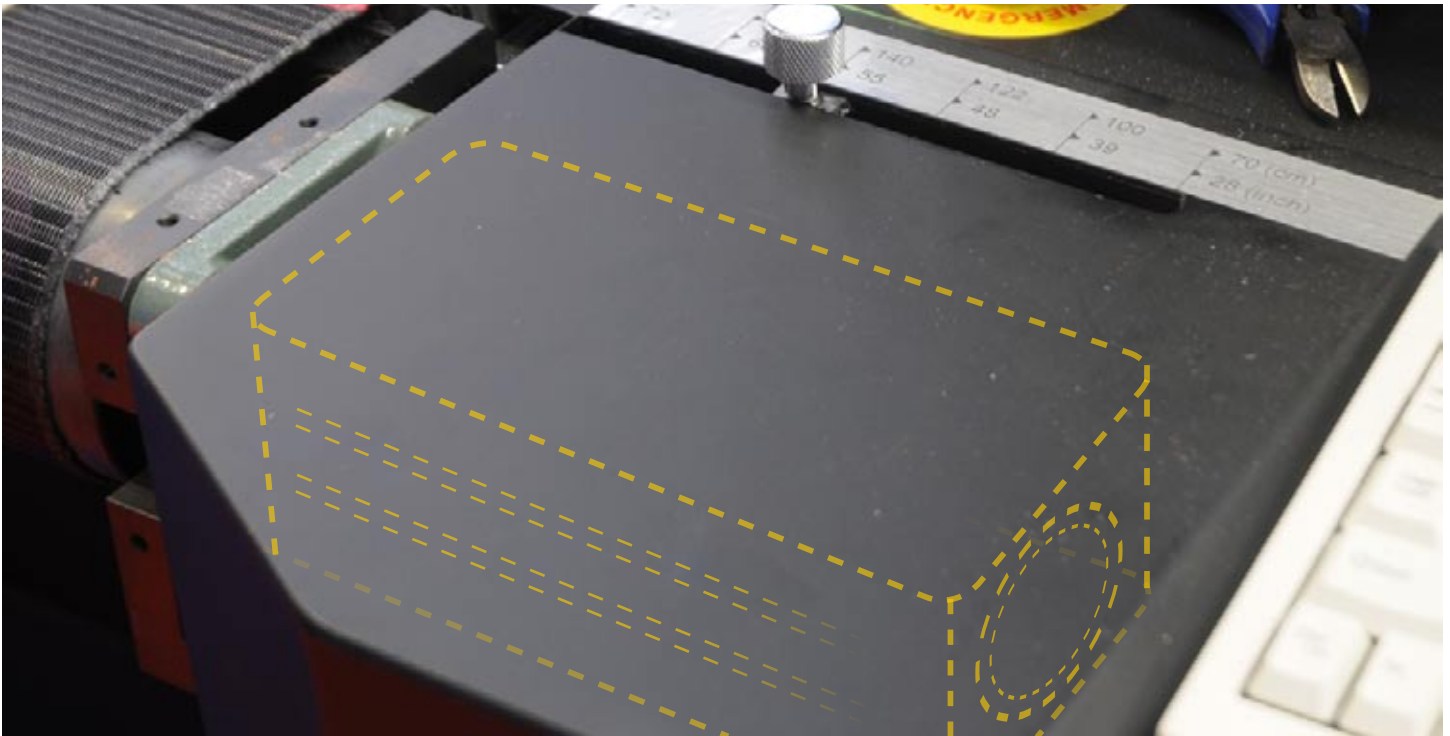
32. Why did your designers select this structure for the transport belt?

A combo printer uses a moving transport belt instead of grit-rollers. A moving transport belt has its own pros and cons. MDO boards can skew if fed in the narrow dimension (even on a \$300,000 big-name brand printer). Some transport belts “wander” if they are not calibrated. This is not serious for roll-fed materials, but is not good for flat materials.

So yes, all UV printers can print on practically everything, but not all UV printers can move every different kind of material through the printer with perfect precision.

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

The front roller controls the movement of the belt. The motor that moves the roller is at the right, inside the printer, below the main control area.



The motor of the front roller is inside, just below the main operation area. This is the motor that generates the movement of the transport belt.

34. How well does this belt hold up to heavy use? Does it skew?

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

Several other UV printers have an infamous record of belts that may be so unstable that they “wander.”

But with even the combo belts that are considered acceptable, some materials will skew: depends on belt usage, wear-and-tear, on material weight and surface characteristics, etc.

35. How often does the main flatbed transport belt need to be replaced? At whose expense? What is the cost of a replacement belt?

The printer is moving from alpha to beta stage. It will need to have a time in a real environment to know how often you need to know how often you should change parts.

One printshop that we inspected had to replace their transport belt four times (DuPont Cromaprint 22uv, known for its early transport belt problems). At least DuPont was honorable and covered the cost of the replacement itself. Now that DuPont has pulled out of UV printers, the people who bought this printer may have to pay over \$2,000 per new belt!. In comparison, the replacement belt of a Dilli UV printer costs about \$400.

So this is one aspect of the printer that we will keep in view. But so far, on printers such as the Durst Rho, I have never heard of them having serious or consistent problems with their transport belts.

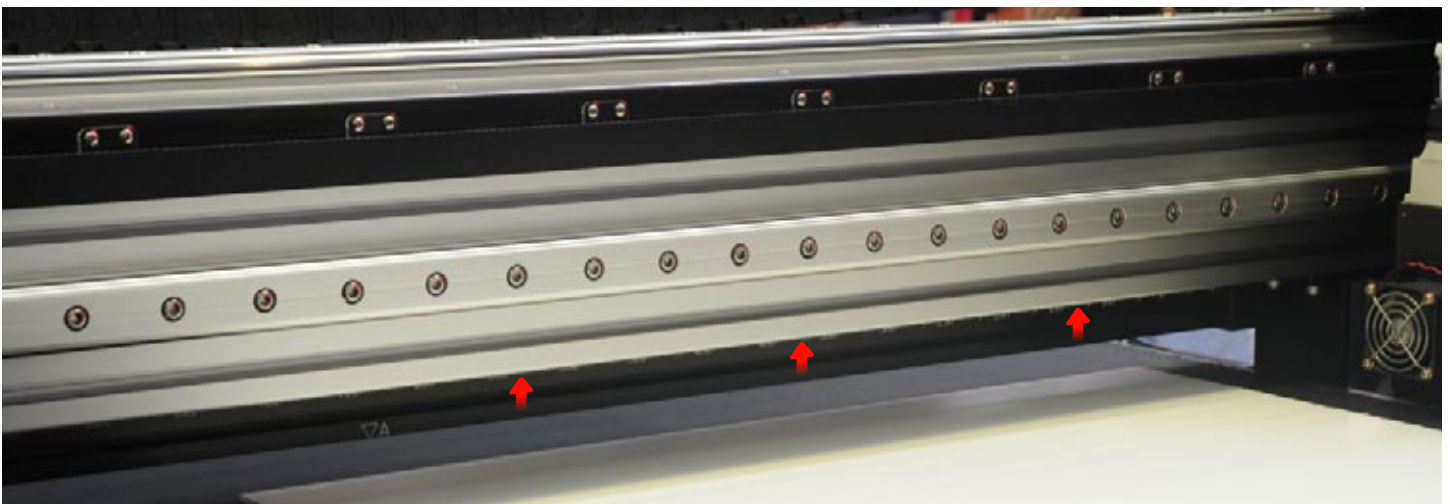
LINING UP FLAT MATERIAL (to help it feed straight)

36. How is rigid media fed?

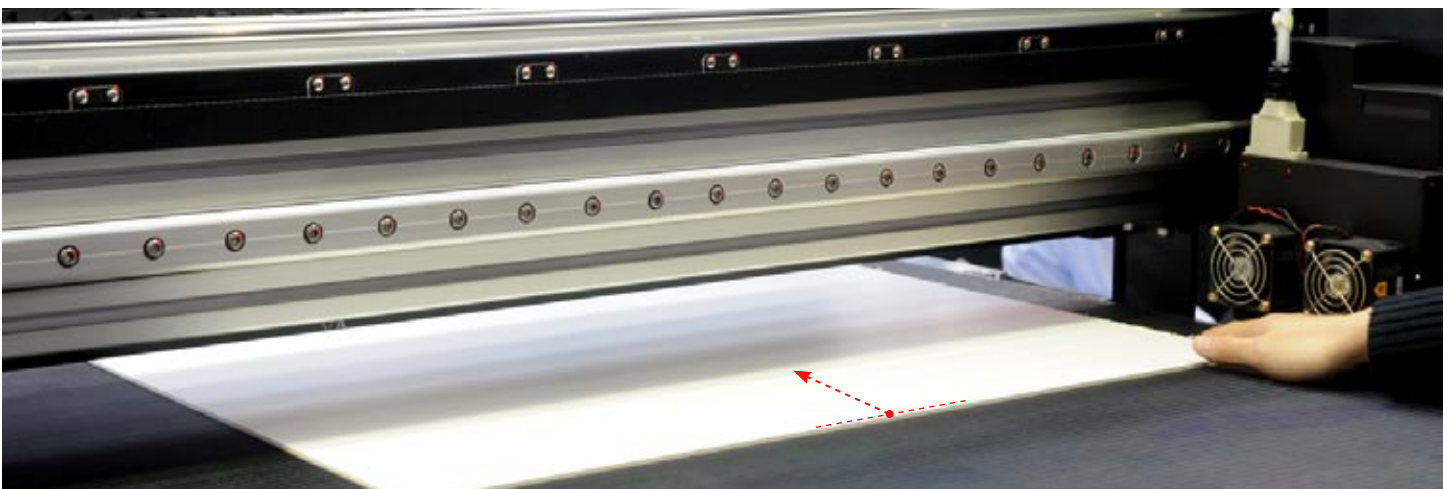
Media is fed manually at the front. You align media against a registration bar, once media has been placed and aligned on the surface, you would need to move the transport belt towards the back, so as to put the front edge of the board just below the printhead carriage.



Media is aligned against a registration bar (b) that is moved up and down via software.



Once media has been properly aligned, the registration bar is lifted so that the transport belt and media move freely.



When the registration bar has been lifted all the way up, you can move the transport belt backwards, so as to place the edge of the media just below the printhead carriage.

37. Is a feeder-stacker option available?

The StellarJET K72UV is an entry-level printer. Any auto loading system is more likely to be present on high-end machines that cost over one million dollars.

38. What kinds of raised guide bars (alignment bars) along the side of the table exist? Left or right? How long?

The alignment is done only with the registration bar that moves up and down. The model exhibited at FESPA '09 didn't have any guide bars at the sides. Guide bars will tend to appear more commonly on the accessory tables.

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

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).

40. Where is the registration gate located? At the back? Under the carriage? Or in the front?

As you can see in the pictures, the registration gate is located at the back.



This photo was taken from behind. The registration bar is located at the back of the bridge. You can still see the edge of the board that is being printed on.

41. Does the drop-down gate have moveable features to assist in registering materials?

No, there is no movable feature to assist the registration of materials.

42. Does the drop-down gate have features to facilitate placement of multiple small materials against it?

No, there is no movable feature to assist the placement of small materials.

43. Is there any other feature that assists in aligning the ability to feed multiple small materials simultaneously?

The Legend 72HUV has a clever accessory that you attach to almost any location on the top of the table to set up feeding paths to align multiple boards for simultaneous printing.

44. Can you be feeding or aligning new material at one side of the printer while the previous job is still printing out the other side?

Media is fed at the front, then it is moved backwards to start printing. It is not possible to load another board while printing because the transport belt is constantly moving while printing the first board.

45. Do you have to hand measure the media height, to enter it manually into the software?

On the K72UV measurement of media is automatic, whereas in the 183UVK measurement is manually.

ROLL-FED

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

Roll-fed media is also moved by the transport belt. Pinch rollers caused problems, especially with tiles. Pinch rollers work acceptably with large boards of media, but not with small pieces like tiles. A moving conveyor belt is better for architectural materials than a hybrid system with grit rollers.

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

The roll is held in a spindle; a bar that goes through the core of the roll.

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

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

Media feeds directly onto the transport belt, there is no intermediate roller.

49. How do you fasten roll-fed media to the take-up reel?

Even on most sophisticated printers, media is commonly taped down to the spindle.

50. 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.

STRUCTURE: Miscellaneous

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

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.

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

The printer has eight leveling supports.

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.

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

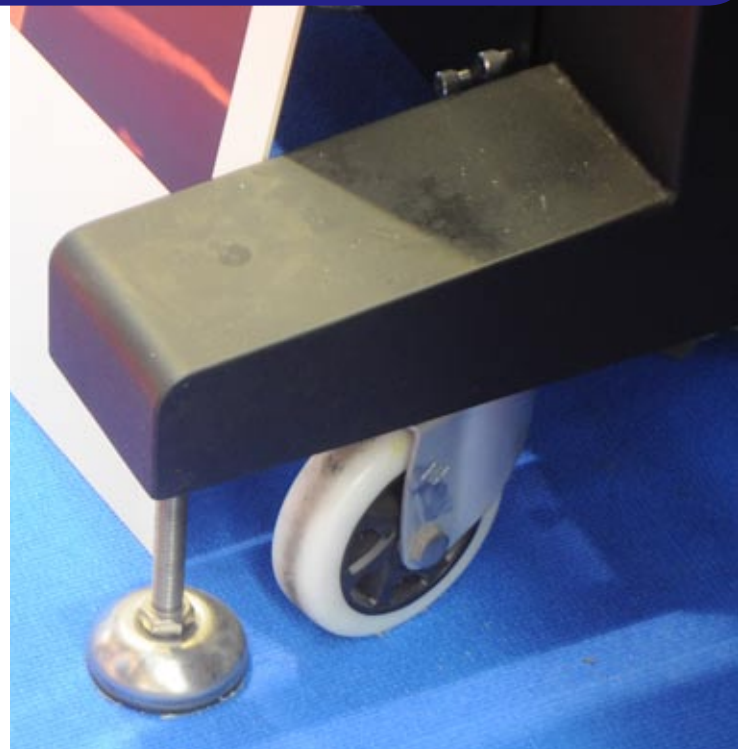
The printer has eight strong wheels.

54. Are the leveling supports part of the wheel, or are the wheels and leveling supports separate?

The wheels and leveling systems are separate structures.

55. Do the wheels have a lock on them?

The wheels don't have any visible lock system.



The leveling supports (c) and wheels (d) are separate structures. On most cases, once you level the printer, it can't be wheeled away.

For any printer weighing over one ton it is assumed that no locks or brakes are needed on the wheels because a tank will not roll anywhere if parked on a level floor.

ACCESSORY TABLES (front and back) for Combo or Hybrid Flatbed

56. What is the approximate size of the table?

The tables are the whole width of the printing area.

57. 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.

58. Do you need to provide an additional table at the front or back?

Yes, you would need a table at the front and another at the back. But these are offered as accessories because GCC is aiming to niche applications such as architectural materials, which tend not to be big enough to require a table.

59. Are the tables an extra charge, or is the price of two tables included in the original price of the printer?

They are extra charge.

60. What is the design of the take-up table?

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

The table is formed by rollers. GCC didn't have tables at FESPA, where we initiated this report.

UPGRADES, Future Improvements?

61. What features have been added, or changed since the printer first appeared?

Since the printer is new, GCC will start to sell it in the middle of July 2009. Upgrades will come eventually when the company has feedback of end users.

Miscellaneous

62. What moves:

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

The printhead carriage moves in the X axis while media is moved in the Y axis by the transport belt.

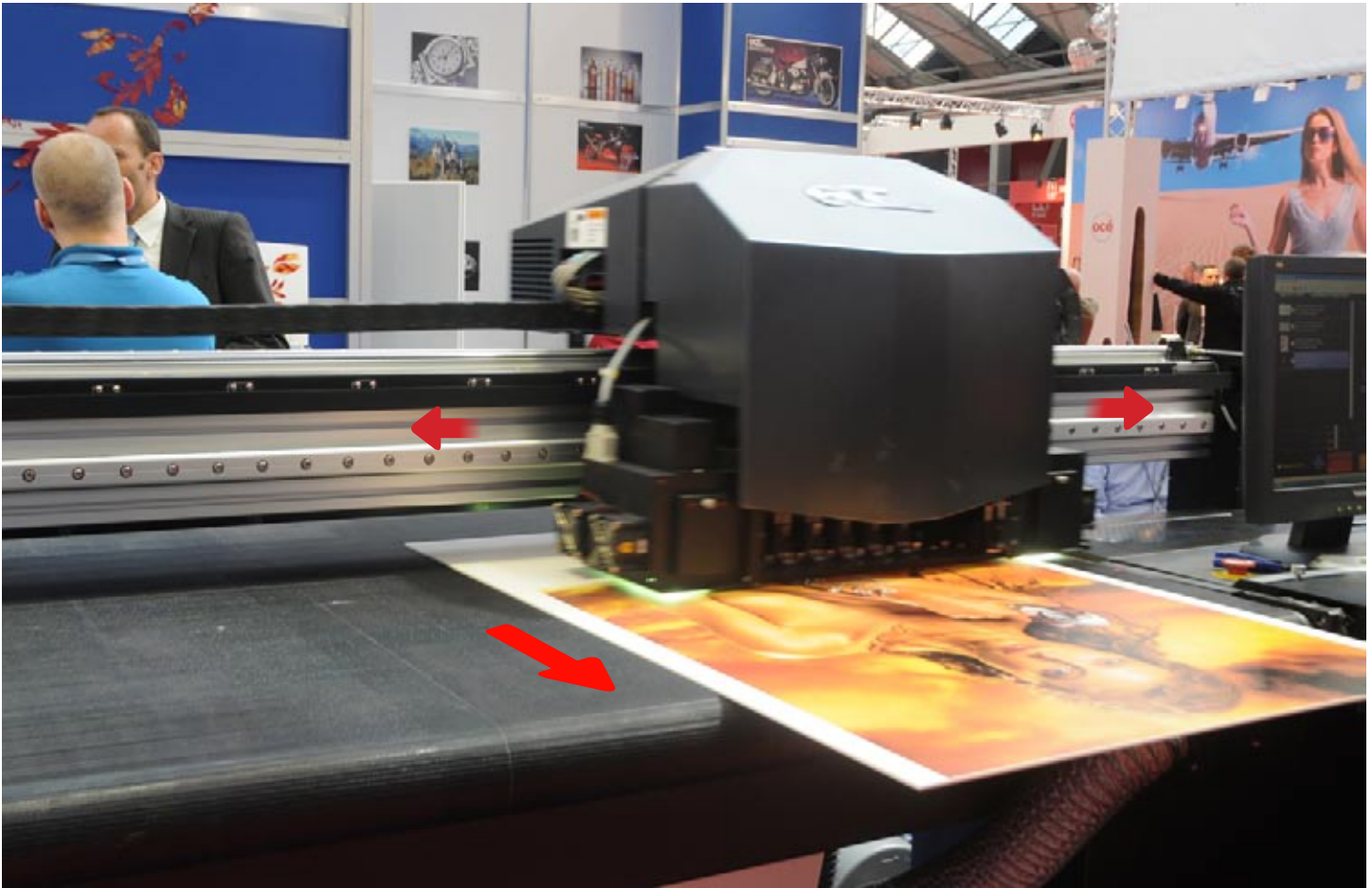
For example, on the Inca Columbia the flatbed itself moves in and out for every line of print. The WP Digital Virtu machine is unique in that it has two options for movement, both the material and the head assembly in X, Y directions.

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.

63. 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 to be printed (thereby be a bit faster?).

Yes, the printhead carriage can move over the length of your substrate and not waste time moving to the end of the carriage space.

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. This is a decision the operator has to make.



The printhead carriage moves in X axis, and the transport belt moves media in the Y axis.

OPERATING THE PRINTER

64. Can the operator manage print jobs via the Internet with this printer?

Not normally. You can send print jobs via network.

65. What sensors does the printer have?

Crash sensors, vacuum sensors, lamp sensors.

66. Which materials are pre-established in the software, or do you have to create the settings for each class of material yourself?

Vinyl, paper, foam, kappa, forex, glass, ceramic.

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

The majority of the operations are software based in the sense that you tell the printer via keyboard and mouse what operations to perform, but it is not a touch-screen system.

The Durst Rho printers are touch-screen operated. The Gandinnovations are keyboard operated. The Fieldcenter Formosa UV printer has many cranks and manual switches. So clearly there are several equally valid ways of operating a computer.

With the Durst Rho current system, everything is on the touch-screen to the point that you almost don't need the keyboard any more. But a full keyboard is available in case you need this for some other function.

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

Yes you get a real 17" LCD monitor.

69. Where does the computer keyboard sit?

In the surface just below of the LCD screen.

70. Can the keyboard be moved or is it fixed into the structure of the printer?

Yes, the keyboard can be moved up to a certain extension.

71. Where does the operator stand or sit?

The operator stands at the right.

72. What aspects of the printer can you operate from behind (the loading area)?

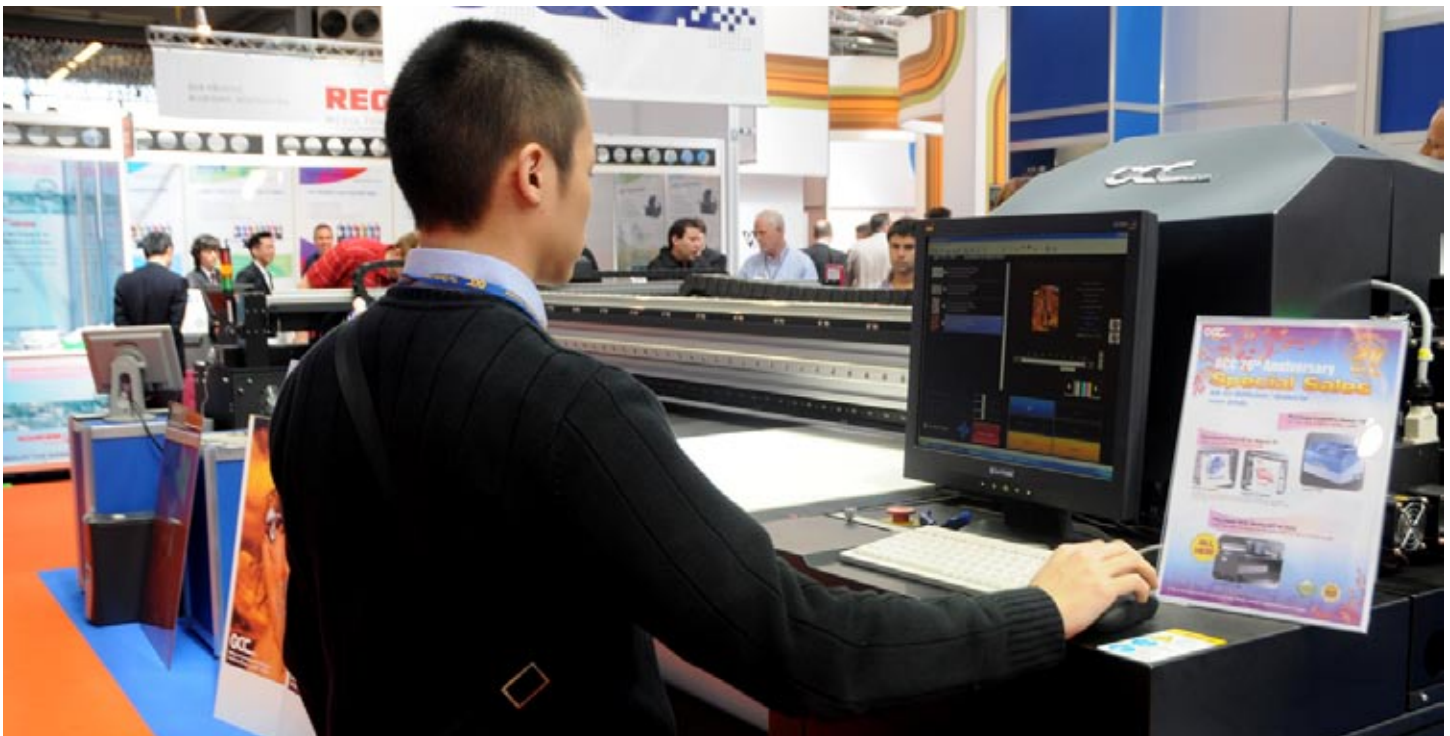
There is no major control at the back.

73. What controls are on either end?

There are no controls at either end.

74. Can you do unattended printing? For how long? How about overnight?

You can do unattended printing for roll-fed materials but it is not advisable to have the printer work overnight. You can print 3 to 3½ mt. unattended but longer than that, there could be a feeding problem.



As you can see, the operator stands at the right, where you find the main control area. Almost all operations are done via software.

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

One is enough.

76. Is there a pole with beacon lights?

Yes, there is a beacon pole.

Dilli was among the first to use a vertical pole with beacon lights. One person said that DuPont's UV printer from RTZ (Flora) was the first of all. 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. The GCC StellarJET 183UVK also has a pole with beacon lights.

CONSTRUCTION (BUILD QUALITY)

77. 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. But if the EU requires a guaranteed parts life-span, this will impact Chinese printer manufacturers in particular. Manufacturers in Korea and Taiwan tend to use sturdy components.

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

The printer looks solid and carefully crafted.

79. Is there a hood?

No hood in the current model. The printer is totally exposed.

A hood protects you from most UV lamp light leak. A hood protects you, to some degree, from misting UV ink. With a hood it is easier to exhaust ozone and misting UV ink (if you attach a ventilation system to a vent opening in the top of the hood).

But since it is expensive for a printer manufacturer to add a hood, most entry-level UV printers have no hoods. An exception is ColorSpan; they sell so many UV printers, and many go to relatively family-operated companies, that not to have a hood would be too risky for possible future lawsuits. Yet in the real world most printshops run their printers with the hoods completely off (or opened).

80. Does the printer wobble when printing?

There is no significant vibration when printing. But a little wobbling is common even in high-end machines due to the high speeds of the printhead carriage.

AESTHETICS

81. How would you describe the design of the printer?

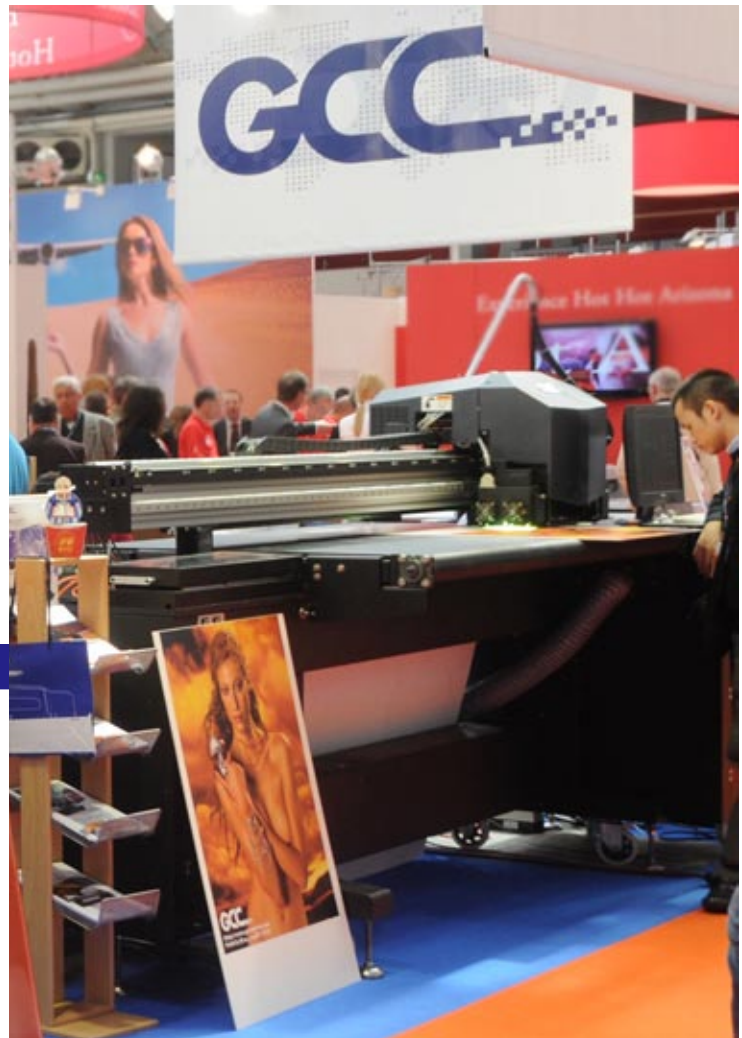
The printer looks firm and simple. The manufacturer built a basic design so as not to make it more expensive just because of the outer look.

82. Can you easily distinguish which is the “front” and which is the “back”?

Yes it is easy to distinguish the front from 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.



The StellarJET K72UV is totally exposed, so no hoods in it. The printer has a basic industrial design.



Back view of the printer. You can easily distinguish the front from the back.

SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS

83. What is the delivery time, between the time I order the printer and it is delivered?

Delivery time is four to six weeks depending on the configuration.

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

Because of the size of the printer, you wouldn't need any complex installation, but in general 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 ever 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).

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

Temperature and humidity are indeed crucial, especially humidity. Even more important is that whatever temperature and humidity is present in the work area, that it not vary during the day: cool in morning, hot by 11 am. Hotter by 2 pm.

86. 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.

87. 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.

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

Network and USB2

89. How many boxes arrive?

One wooden crate.

90. What comes in the box?

The machine, the box for the PC, and the vacuum pump are in the main container.



The wooden crate you receive comes with the printer, the PC and the air pump system.

INSTALLATION OF THE PRINTER

91. Realistically, what expenses must you incur for the installation, such as a fork-lift truck or crane to lift the printer off the truck?

Yes you would need a fork lift truck.

92. Does the printer have spaces for the forks of a forklift truck to get a balanced hold on the bottom of the printer?

Most sophisticated UV printers of most brands have rectangular brackets built into the underside of the printer, usually both front and back, so you can use a forklift truck. Most UV printers under \$150,000 do not have special spaces for the forks of an unloading truck.

93. Can you install this printer yourself?

You would need the help of a technician. The tech(s) is sent for three days for setting-up and training.

94. Is installation included in the purchase price?

Yes.

95. How many people come for the installation?

It depends on how many techs does the dealer have available. GCC sells only through distributors.

INSTALLATION OF THE PRINTER: INSTRUCTIONS & MANUALS

96. How many manuals are available?

There is a user's manual and a technical manual.

97. What is the native language of these guides? Is the translation acceptable?

The following statement is as valid for a \$400,000 UV printer as it is for a \$70,000 model. 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.

90% of the manuals whose native language is other than English use terms that are too literal: they are translated terms, not the actual terms that anyone in America would use. This is a polite way to say, that every manual should be read by a native English speaker who is familiar with the jargon of UV printers.

98. How hard, or easy, are the manuals to obtain BEFORE you buy the printer?

GCC supplies FLAAR with all its manuals. Some printer manufacturers hide their manuals because they don't want anyone to see them. Yet MacDermid ColorSpan offered their manuals openly on-line (on their web site). So the policy varies by manufacturer. We do a full report only on those printers where the manual is available to us.

TRAINING**99. Is training included in the purchase price? If so, what kind of training is offered?**

Yes, as mentioned earlier, techs are sent for three days for installation and training.

100. Is training necessary?

Yes, for the end-user in installation days.

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).

101. Is classroom training available?

No, classroom training is not common. Training is done on-site.

102. Between the day the printer arrives, how soon is it realistic to achieve full productivity?

The expected productivity can be reached in two days after installation has been finished. If you intend to print on unusual materials, you will need to practice and learn which pre-treatment, which primers, and whether you need post-treatment (coating liquid, for example).

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.

After speaking with many different printshop owners, what I am learning is that if the printer is cheap and junky you will have constant down time due to the printer breaking down (reports from owners of Infiniti UV printer). If the printer is expensive and complex, it takes longer to understand everything and achieve full productivity. And when an expensive and complex printer does break down, it takes longer to repair.

TECH SUPPORT & WARRANTY**103. What is the original warranty period?**

12 months.

The normal original warranty period is one year but Gerber has had a special offer of "second year free if you buy before such-and-such a date.

104. How does this warranty period compare to warranties of comparable printers?

Roland also now offers a two year warranty but this is because they want to sell you Roland branded ink and Roland branded substrates. They can only sell you these higher priced consumables if they provide a free warranty. If you do not use Roland ink, the warranty is voided anyway. But there are not really any or many UV printer manufacturers who sell their own branded media, so there is no reason for a UV printer manufacturer to offer more than a one year warranty.

In the past Grapo offered a two-year warranty. That is because their UV printers are relatively simple (in a positive sense, meaning less to break down).

105. Is there an extended hardware warranty? What price?

Yes, you can extend your warranty for three months. This applies also for the 183UVK.

106. 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...)?

Technicians are directly trained in the factory.

107. 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. 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 received information of several instances in Australia of poor tech support for various brands of printers, probably because of the time and expense of sending tech support people to a factory in Japan, Europe, or the USA for training on each model.

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.

108. Can the manufacturer remotely diagnose the printer?

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

109. What is the native language of the tech support person?

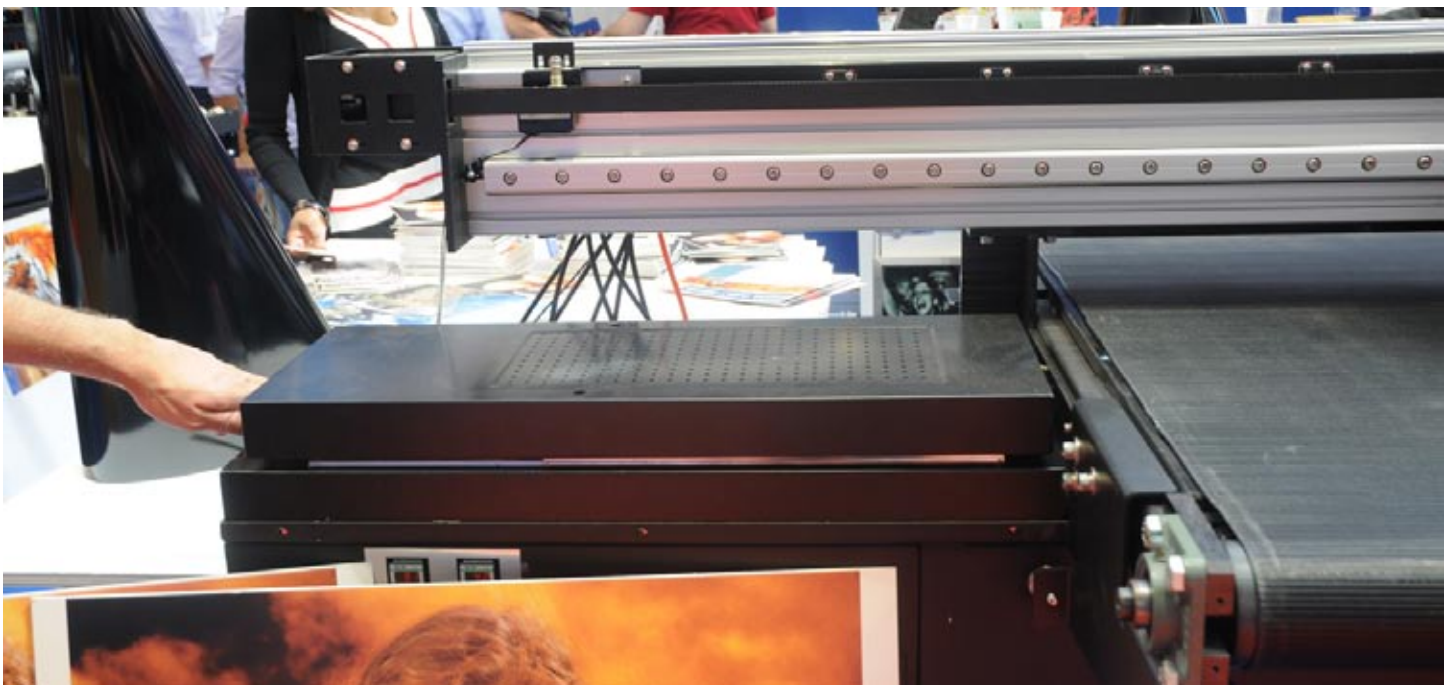
It depends on the dealer you select according to your location. There are techs who speak English, Turkish, Polish, German, Chinese, etc.

CLEANING & MAINTENANCE NEEDS**110. How easy is it to access the area where you have to clean the heads?**

Since the printer is totally open, the cleaning area is easily accessible. The service station is semi-automatic.

111. How is head cleaning accomplished? purge, suction, manual, other?

You clean the heads by purging.



Cleaning of the heads is done at the left. The carriage is placed on top of this area so that the ink can be purged out from the printheads.



The cap can be slid out. The surface that receives purged ink is slanted towards one end so that the ink won't accumulate.

112. To what degree is purging automatic (once you press a button), and to what degree is it manual?

Purging is manual.

113. How often should you purge? Does the User's Manual honestly indicate how often you should purge?

You should purge every morning. The cleaning process must be performed daily.

114. 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?

Purge is done with ink.

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.

PRINthead TECHNOLOGY

115. Which brand printhead is used?

Konica Minolta heads.

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.

116. Which model of printhead is used

KM512MH

117. Is the printhead identified in the spec sheet brochure by brand or also by model, or not at all?

The brochure identifies only the brand of the printhead.

118. Is only the printhead used by itself, or is an entire electronic assembly also from the printhead manufacturer?

Only the printhead is from Konica Minolta.

119. Is this a printhead adapted from solvent ink or a new design made especially for UV ink chemistry?

Konica Minolta has two versions of this model of printhead, the 512MH is for UV ink and the 512MN is for Solvent/oil inks.

120. How many other printers utilize the same printhead? Have they shown any problems?

The GCC 183UVK, The Flora F1 250UV, the Gerber ion series, the GRAPO Octopus and Manta, the SkyJet UV Flat-bed, Sun Neo UV-LED Evolution, among others. We have done serious evaluations on most of these printers and have found that the Konica Minolta heads work perfectly and produce beautiful output on most of the cases.

121. What are the benefits of this printhead?

It offers four levels of grayscale (four sizes of drops) and its alignment is done easily.

122. How many nozzles per printhead?

512 (256 in two lines).

123. How many printheads per color?

It depends on your ink configuration. If you choose the standard CMYK, you would get two printheads per color. If you choose the CMYK, Ic, Im, W and Varnish configuration, you would get one printhead per color.

124. How many total number of printheads?

Eight.

125. Are there two printheads for white, and are they separated so one can print before, and the other after the regular colors have been printed?

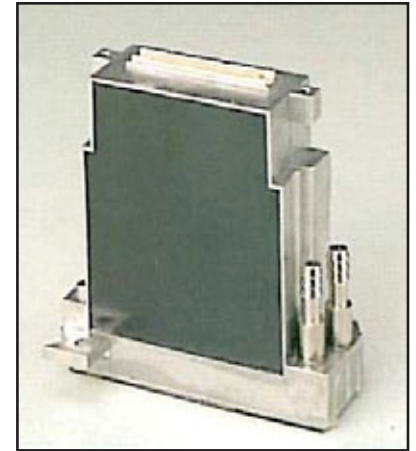
If you choose white, you can use only one head for white.

126. Is the printhead for the white ink the same model as the printhead for the other colors?

In the beginning, DuPont tried to use a printhead for the white ink that had a larger droplet size. However gradually they switched to using all the same model printheads. The reason a larger drop size for white ink is a good idea is because otherwise you need two printheads in order to make the white ink opaque enough. But it turns out you need two printheads for white ink anyway, so that you can jet down a flood coat of white before the rest of the colors (when printing on transparent or translucent materials).

Nowadays almost all printer manufacturers use the same printheads for white that they use for colors. What is different is that the ink tanks for white require a method of agitation so that the pigments of Titanium dioxide don't settle out.

The only instance that I have heard of recently where a new UV printer is designed with special heads for white ink is where the newest L&P Virtu uses Spectra M Class heads which are MEMS technology. These are not yet appropriate for using with white ink, so a different model head is used just for the white.



Konica Minolta 512MH printhead.
(Photography extracted from material provided by Konica Minolta).

PRINthead DPI & Features

127. What is the drop size in picoliters?

14 picoliter drop size.

128. Is there variable droplet capability?

Yes, these heads offer four levels of grayscale.

129. 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?

720dpi with CMYK configuration and 1,440dpi with Lc, Lm configuration.

130. What is the true dpi of this printhead? If the spec sheet uses the concept of “perceived dpi” or “apparent dpi” how they calculate perceived dpi instead of true dpi?

The printhead specs sheet lists 720dpi for this model.

131. How many passes can this printer achieve?

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).

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

There are three levels of quality identified for the StellarJET K72UV.

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).

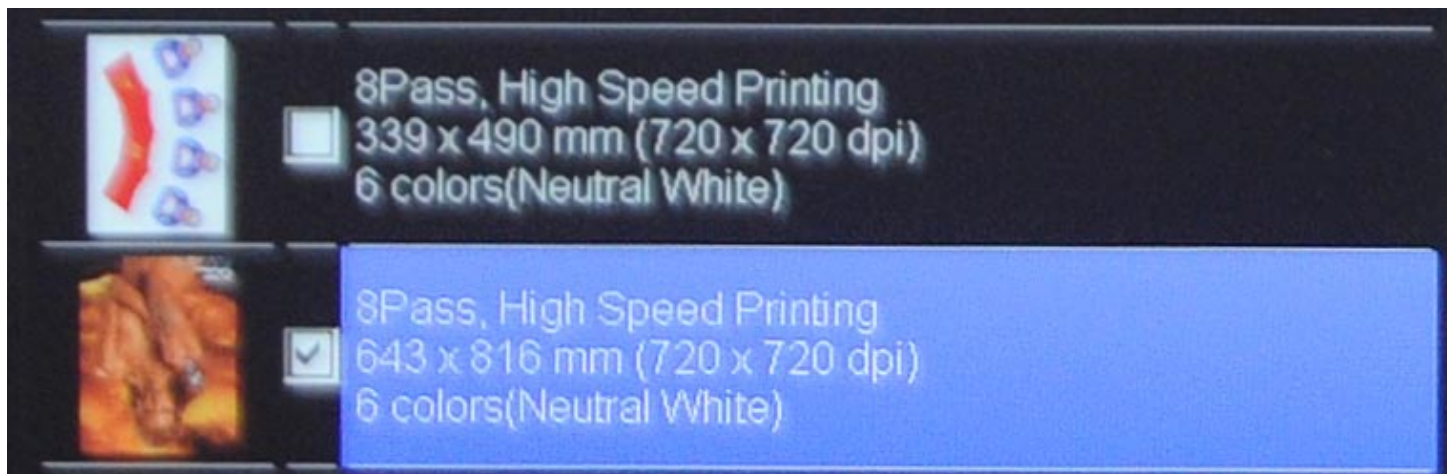
Most printer manufacturers would rather avoid having to state clearly how many actual passes it takes to achieve specific quality levels. So they create “modes” that are a combination of passes and possibly other features that result in a specific quality level.

133. If modes, what are the modes called?

Fast Mode: 29m²/hr (319 ft²/hr),
Production Mode: 14.7m²/hr (162 ft²/hr),
Quality Mode: 7.4m²/hr (81 ft²/hr)

134. At trade shows, how many passes is the printer operating at to show the results?

The printer was set to print at 8 passes at FESPA Amsterdam ’09.



This is a zoom-in to the area in the monitor where you select the quality mode of your print job.

Bi-DIRECTIONAL VS Uni-DIRECTIONAL PRINTING

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

It can be set in both directions.

136. Which materials can be printed fast at 2-pass or 4-pass modes?

The number of passes needed may also depend on how worn the printheads are. If the printheads are old you may need more passes than when the printheads are new.

PRINthead Positioning

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

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.

138. Can you vary the gap (the distance from the printhead to the media, which is the distance the ink droplets must fly)?

Yes, the carriage height can be varied via software.

SUBSTRATES

139. Can this printer handle rigid material only, or roll-to-roll only, or both interchangeably?

This printer handles both roll-fed and rigid materials. A combo (transport belt) system tends to handle rigid media better than a hybrid system. For example, the K72UV handles a wider range of rigid media than the 183UVK, in part because the first can print on media up to 5cm (2") thick, whereas the 183UVK handles rigid media up to 2.54 (1") thick. The downside of a combo printer is that in some cases, belts tend to skew after a while.

140. What sizes of material can be printed on?

You can handle media up to 1.83mt (72").

Print width tends to be the number used in the name of some printers.

141. 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.



We drew an imaginary yellow line to show that the printheads are placed in a row. At the right end of the space for printheads you see two empty slots (c) for the optional colors.

Print width	Material width	Claimed by how the model is named
1.83 (72")*	1.83 (72")	GCC StellarJET K72UV

*The print width and media width are the same according to the official brochure.

142. What about edge-to-edge printing (borderless)?

Yes it is possible.

LOADING MEDIA

143. How about maximum roll diameter or weight?

The printer will handle rolls of a weight up to 70Kg.

144. What thickness can this printer handle?

5 cm, which is about 2".

145. 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").

SUBSTRATES, Materials, Applications, and Issues

146. What materials does the manufacturer list?

Glass, ceramic, wood, foam, kappa, etc.

147. What materials can this printer print on okay?

It helps if the material is a clean, homogeneous surface, and should all be the same thickness.

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

So far there is no restriction on a specific media, but again, the printer is new and we would have to test it in a real environment to determine whether there is any material you shouldn't try with this printer.

Some manufacturers are beginning to place the UV lamps slanted outwards, so that the UV light won't reflect back to the printheads when you are printing reflecting materials.

149. 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 for mercury arc UV lamps 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).



Print sample on glass exhibited at FESPA '09.

One way to dissipate heat is to have good ventilation drawing the hot air up and out of the enclosed printer. There are two exhaust tubes at the top for this purpose. These are not only to suck out the odor and ink mist, but to remove some of the heat too.

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

- You need to 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.

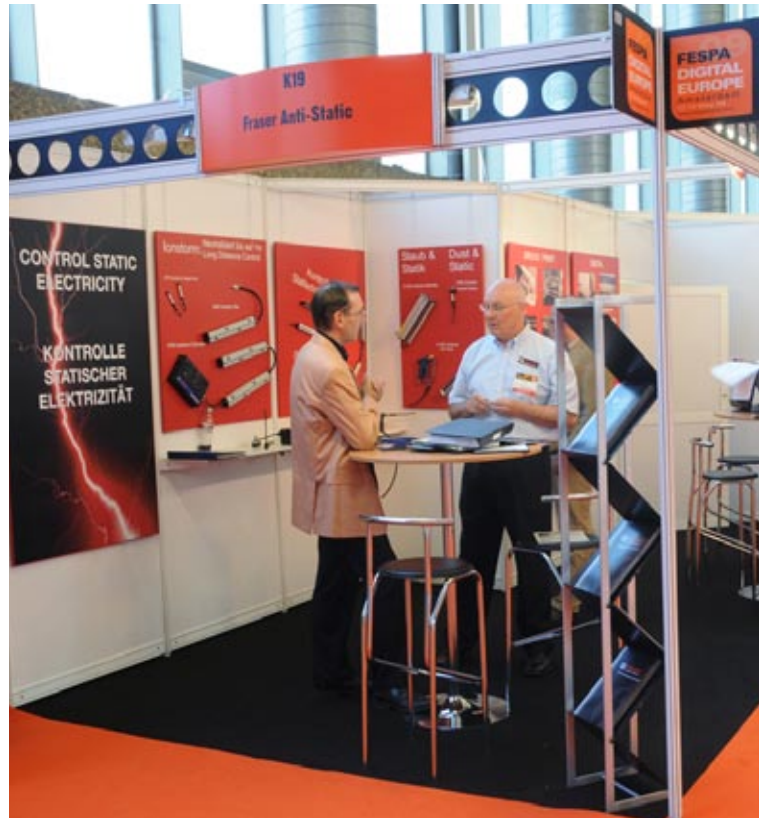
Nonetheless, some UV printers already have anti-static systems carefully built into their printers. When these work it documents that the investment is well spent. However if the low price of your printer is in part because there is no on-board static system, and if you indeed have a static issue, the 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.

One economical way to get rid of some static is to use a fabric softener –Downy for example–, which you can get from the supermarket. But be sure to learn which materials need anti-static treatment. No sense wasting time with those materials which do not have a static issue.

And be aware that the amount of cleaning liquid you put onto a material can cause after-effects when that same material is heated by the UV lamps.

151. 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.



Fraser Anti-Static is one of the companies that manufacture components to fight electricity charge on substrates. Printer manufacturers are beginning to be aware of the need of static problems in some materials.

SUBSTRATES: Cleaning, Priming, Preparation

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

Ideally you would need to brush off your boards. But some materials are manufactured especially to be printed on, and come with a protective plastic layer to avoid dust and grease.

For flat rigid material 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.

I rarely see any printer operator attempting to clean roll-fed materials.

153. What liquid cleaning material should you use to clean your materials? Which kind of cleaner, and which kind of materials per cleaner?

Cleaning is done with a solvent liquid.

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

GCC is honest to warn upfront of the need of a pre-coat and a top-coat with primer for some materials. This honesty is acknowledgeable among other companies' unrealistic claims that state their printers print on everything, without need of a pre-treatment.



Samples printed on with the GCC StellarJET K72UV at FESPA Amsterdam '09.

155. 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).

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

In the brochure you see clearly listed ceramic tiles, acrylic, glass, stainless steel as some of the substrates that could have a UV ink adhesion issue, and thus need to be treated before and after being printed on.

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. Lamination will also cover up "lawnmower banding" appearance. Lawnmower appearance is caused by bi-directional printing.

SUBSTRATES: General Concerns

157. 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.

You need to test each material yourself before you promise your client you can do a job that will hold up six months or a year.

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

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 DuPont Cromaprint 22uv.

WHAT IS THE INTENDED MARKET FOR THIS PRINTER?

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

Although the traditional market for a UV printer can always be signage, GCC is aiming to architectural materials. As mentioned before, the K72UV is considered an upgraded version of the 183UVK. Among the improvements is the ability to handle glass, ceramic tiles, and others.

INK

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

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

At DRUPA 2008 (if I remember correctly), Durst announced that a heat-formable ink would be available for their Rho printers.

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

CMYK is the standard configuration, but you can order a (CMYK, Ic, Im, W and Varnish) configuration.

162. What is shelf life of the ink (CMYK)?

Approximately 1 year.

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.

163. What company makes the inks? Choices include Hexion, Sericol, Sun, Triangle, Toyo, and several others.

The ink will be from Toyo or from Sun. It hasn't been determined yet. Although it is more likely the ink is going to be from Toyo because of the print-heads.

INK: White & Varnish**164. Is white ink available?**

Yes. White ink is available but it doesn't come in the standard configuration. If you need white, that is an extra cost.

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

You can choose a basic ink configuration, or an advanced configuration which includes light cyan, light magenta, white and varnish, in addition to the standard CMYK.

It is claimed that if you have variable droplet heads (and thus can achieve really small ink droplets) that you don't absolutely need light Cyan and light Magenta. But on the Océ 250, they claim this and I am skeptical; or maybe it is just the dithering pattern of their PosterShop RIP that causes the noticeable dithering pattern (this RIP is renowned for this issue).

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

There are 2 ink lines available for white option.

167. Is the white ink opaque enough?

The following is a general statement and is not directed at any specific company, but is based on inspecting printshops that have white ink installed. The majority of printshops with white ink installed report that white ink has innumerable issues and is not as realistic to use in your printshop as it is portrayed in a trade show booth or a printer manufacturer demo room. I would not be convinced of the white ink of any company: whether European, US, or Japanese, until I have visited a print shop where it was functioning flawlessly over a several month period.

168. What is the shelf life?

Shelf life of white ink is similar to the shelf life of CMYK inks, 1 year.

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

You just need to clean the printhead for white more often: twice a day.

170. Is the white ink situated in the same area as the other inks?

This question is in the FLAAR FAQs because the Zund 250 situated their white ink up inside the printhead carriage. If you have 500 features on a printer, 200 tend to be standard (similar solutions on most UV printers); another 200 are special or have a few tweaks, and one or two are unique.

171. Is spot varnish available?

Varnish is an available option for €4,000.

INK Cost**172. Does the refill container of ink come in cartridge, bottles or bulk? How large are the ink containers for this replacement ink?**

Ink tends to come either in bottles (where you pour the ink into the ink container on the printer) or containers that are themselves the ink container: you take the old one out; throw it away; and place the new container in its place. Cartridges tend to only be used in printers with Epson printheads. No currently functioning UV printer other than the narrow format Roland LEC-300 uses Epson printheads: one Eastech printer tried, but it is not widely used.

173. How many liters of ink does the on-board ink container hold in the main tank?

The ink containers hold 2 liters each.

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

The price of ink will depend on what ink will GCC decide to use. Approximately it will be around € 120.

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.

175. Does the printer itself have a means to keep track of ink usage? Is this a guesstimate, or an actual count of droplets fired?

Yes, you can see ink usage via software.

176. Where is waste ink collected? In a tray? In a bottle?

Waste ink is collected in a bottle located in the left cabinet.

177. How much ink does the waste ink container hold?

2 liters.

INK: Supply System, Tubing, Filters, etc

178. Where are the printer's ink containers located? Front, back, or end? Up on top or lower down?

Ink bottles are located in the left cabinet.

179. How much ink does the ink container in the printer hold?

Two liters.

180. How is new ink added? Pouring into the on-board container? Switching the container to the new ink container?

New ink is poured out into the bottles.

181. What is the situation with the ink gelling?

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.

182. Is there an issue with "ink starvation?"

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

183. Are ink tubes black, opaque but white, another color, transparent?

Yes, ink tubes and ink containers are black.

The first year's production of the hybrid UV printer of Infiniti used ink tubing so flimsy that the tubes split, dissolved, or became disconnected on a regular basis. This is what happens when you take a solvent printer and try to retrofit it to take UV-cured ink. But something similar happened when Roland and other companies tried to run the first generation eco-solvent ink through their printers which previously were made only for water-based ink: the fittings and other parts of the original ink delivery system were made to handle water, not solvents. There were endless tech support issues for more than a year as a result. At least Roland and Splash of Color finally fixed these issues (and two different eco-solvent ink chemistries were developed in subsequent years as well).

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

The printer uses an Igus e-chain. The serial number of the model used is 240-05-055-0 E2 "medium".



UV inks are more expensive than solvent inks, but a UV printer consumes way less ink than a solvent printer. The ink containers of the StellarJET K72UV hold 2 liters each.

The energy chain is the plastic linked system that holds all the cables and ink tubing so that it does not get rubbed while being moved back and forth to feed the carriage. Most mid-range and almost all high-end UV printers have an energy chain from the company Igu.

185. Where, and in how many locations, is the ink heated?

In over 80% of the UV-curing printers that I have inspected, ink tends to be heated in two locations: in a sub-tank, and on the printhead. Most UV printheads have special features in or on the printhead to facilitate heating the ink. This is to prepare the viscosity so the ink is liquid enough to jet out the nozzles; this ink heating has nothing to do with the ink needing to be cured.

So far, the only printer whose ink does not get heated at the printheads is the new Roland LEC-300. This is also the only UV printer, so far, which successfully uses an Epson printhead.

186. 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.

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

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 Color-Span 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.



Ink containers are located in the left cabinet. As you can see, all the containers and tubes are dark to avoid exposure of ink to sunlight.



The e-chain is designed with a smooth interior to extend the life of the cables. The links provide flexibility without pressing or bending cables.

INK: Longevity

188. 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.

INK Color Gamut

189. Which colors print best?

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

190. Which colors print poorly or not at all?

When you do test prints, try various reds; try a wide range of yellows and greens. Try a red-brown. These are colors which may present issues.

THE UV CURING LAMPS

191. 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.

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

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 Océ Arizona 60uv printer). LED lamps are now being tried in several UV printers, such as by Sun LLC (in Russia), Mimaki, and Roland. The Gerber Solara ion uses a rare type of long relatively cool UV lamp that is not used by any other wide-format inkjet printer manufacturer.

193. How many watts are the lamps?

550 watts per lamp.

194. What is warm up time?

90 seconds.

195. What brand of lamp is used?

The GCC StellarJET K72UV uses the same brand of lamp as the 183UVK. UV lamps are made by a local Taiwanese manufacturer.

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.

196. 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), and its recent replacement, the :Anapurna XLS, have three sets of lamps: all curing, not for pinning. 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).

197. What shuts the lamps off? For example, after so many minutes of not being used; or if they overheat?

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 (if they are mercury arc). 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. Most of these issues are with mercury arc lamps (due to their intense heat). You don't have these problems with LED lamps.

198. 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.

199. 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.

UV CURING, and ODOR of the printed image

200. 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.

201. Is there any heater to assist in drying the inks (drying as opposed to curing)?

I believe (if I remember correctly, I am writing this on a train from VISCOM Germany in Frankfurt, to inspect two UV printers in a printing company in Hamburg), the Mimaki LED-curing model 160 has a heater to assist curing; if not the Mimaki, then the Roland; one of the two appeared to have a heater.

UV LAMPS: Cooling

202. Are there shutters?

Yes. Shutters are automatic in this model, which is one of the differences between the K72UV and the 183UVK; the latter has manual shutters.

Shutters help control light leak and save from having to turn the lamps off. So the lamps last a bit longer and you can be more productive, not having to wait for the lamps to cool down and then warm up all over again. But shutters are primarily for controlling the extreme heat of mercury arc UV curing lamps.

203. 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.

204. How are the lamps cooled? Air? Fans? Water-cooled?

Yes, lamps are cooled by fans.

205. How many fans are there per lamp?

Two per lamp.

206. 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.



The UV lamps are cooled by two fans at the side of each lamp.

UV LAMPS: Reflectors

207. Are the reflectors at an angle? What angle, and why?

A wrong direction would be light that reflected off the surface of the material up into the nozzle plate.

RIP SOFTWARE & Printer Software

208. Which RIPs are featured?

There are options for the RIP. You can choose either ONYX or Wasatch.

209. Does the price of the printer include a RIP?

No, the RIP is an additional item.

210. If a RIP is bundled with the printer, might you later wish to add an after-market RIP to be fully satisfied?

You can change RIP later on if you wish to.



RIP stands for Raster Image Processor, and it is the software that brings out all the capabilities of a printer. RIP manufacturers are developing software with new functions to assist end-users not only in the printing process but also in other steps like cutting, calculating price per work, etc.

COLOR MANAGEMENT FEATURES

211. What color management sensors or measuring tools are on-board?

ColorSpan has color management tools built into its UV printers, but otherwise this feature is not yet available on other brands of UV-curing wide-format inkjet printers.

PRODUCTIVITY & ROI (Return on Investment)

212. Can you sell the output at the machine's fastest output speed or is the quality at that speed not acceptable to most client standards?

90% of the different brands of printers can't produce usable output at their fastest claimed speed. So I call these speeds "junk mode." It is false advertising in probably half the spec sheets.

ADVERTISING CLAIMS:

213. What advertising claims use smoke-and-mirrors to hide something, or make a claim that is not realistic?

The company is very professional and keeps advertising material realistic. The brochure lists features like white, varnish applications, auto media calibration and printheads, but also warns about the need of a treatment process.

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

This is mainly with Chinese-made printers.

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

This is mainly with Chinese-made printers. But, 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

216. 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

217. When people are considering buying this printer, what other printer(s) are they also looking at?

The only other entry-level UV-cured combo printer is the new EFI Rastek H650, which is the combo version of the EFI Rastek T660.

218. What features on the other printers may be issues?

The EFI Rastek H650 was producing beautiful output at FESPA '09. But also notice that the Rastek printers are manufactured in China which is not a feature most people would brag about.

219. What aspects of the selected printer help decide in its favor?

The other disadvantage of the H650 is that it offers CMYK and White optional, whereas the StellarJET K72UV offers CMYK standard and Lc, Lm, W and Varnish optional.

SUMMARY: Image Quality Issues: Banding

220. How can banding be avoided?

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

SUMMARY: Image Quality Issues: General

221. Do you need "Pantone markers" to do touch-ups?

If you use Pantone markers or other markers for touch-ups you run the risk that these areas will fade faster than the original UV ink.

CONCLUSIONS:

222. Are you satisfied with this printer to the point that you would recommend it to someone else?

I would not waste my time spending days inspecting this printer and weeks preparing this report if I did not find that this printer had merit.

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

There are four stages to a FLAAR evaluation:

- “first look” at major international trade shows
- demo room testing,
- factory visit,
- and site-visit case study in a printshop.

So far we have done the “first look” at FESPA Amsterdam `09 but expect to update the current report substantially after visiting a demo room in China, after APPPEXPO trade show in Shanghai.

Conclusions

Pros

This is the fourth UV printer manufactured by GCC, so the K72UV receives all the previous years of experience of the company on UV technology. GCC designs and manufactures its own chassis, unlike some companies that use a solvent chassis and just retrofit it with UV technology.

Besides, it is remarkable that this printer is the result of the feedback of end-users who were asking for an entry-level solution to print on tiles and small pieces of material.

The Konica Minolta 512MH printheads selected offer a high quality in part because of its drop size (14pl) and 4 levels grayscale which allows more graduated images.

Being able to offer white, light cyan and light magenta at the entry-level price range is also an advantage.

The transport belt can be switched from forwards to backwards direction; not all belts can be run in reverse.

Things that might be improved.

A registration system to assist double-sided printing would be advisable.

The bulky air pump takes space from the working environment. Another company that has experience in UV combo printers has managed to integrate the air pump inside the main framework. Of course this company produces mid-range printers (around \$120,000).

Cons

I have spent several days in their factory. I have done a site-visit case study of two of their earlier model UV printers. So I can say that GCC is a reliable company with capable engineers and an honest sales staff.



Complete Workflow for wide-format inkjet printing

Once you have a UV-curable flatbed, hybrid, combo, or roll-to-roll printer, there are several other components of the workflow that you need:

- RIP software
- an understanding of color management and ICC color profiles
- and an awareness of when and whether you need lamination or top coating

Every printer manufacturer will tend to say that the output with their inks do not require lamination....

- But what about floor graphics ?
- What about vehicle wrap ?

And what about covering over cure-banding and banding from feeding inaccuracy ?

- What about the fact that 75% of UV-cured printers can't produce gloss and some not even satin surface appearance?



Hmmm, So now you know why FLAAR is evaluating liquid top-coating equipment and studying film laminators and liquid laminators. Indeed one of the several new staff that we hired is an experienced printshop operator with practice on VUTEK solvent printers and Seal brand liquid laminators.

Our first major research project is on the UV-cured liquid top coating system of Drytac. We found a printshop that had bought a the #1 leading brand of coater, found that it did not

work to his expectations. So he looked around at several trade shows and then bought a Drytac UV coater.



Here is the printer and coater operator, Jacob Duquenne. Notice that FLAAR actually makes printshop inspections and actually checks out how the equipment performs.

The print shop is a 6-hour round trip drive from the FLAAR office in St Louis, so it was relatively easy to reach. You can also download the FLAAR Reports on the other equipment at this printshop: Seiko ColorPainter H-104s.

And, while we were preparing the Seiko evaluation, we decided to issue a complete glossary on solvent printers: eco-, mild-, lite-, and bio-solvent.

FLAAR sent Dr Nicholas Hellmuth and one Technical Writer to inspect the liquid coating system, spending two days at the printshop in Illinois. The FLAAR Report is now coming out this week or next week.

So whether you print giclee, or décor, or signage of all sizes, shapes, and materials, you can now look forward to the FLAAR Reports bringing you innovative reports on more than just printers.

If you need information now (since the FLAAR Report will take another week or so to finish) you can contact Drytac for spec sheets and information on applications: toll free (USA) **1-800-975-6336**, Toll free Canada: **1-800-353-2883**

If from elsewhere in the world, write info@drytac.com

To see the FLAAR video on our inspection for the evaluation, [click here](#)



Here is Nicholas interviewing the owner of the coater. Previously he had bought the biggest name brand, but their UV coater did not function adequately and he asked them to take it back. Then he spent time checking out every single other brand: he selected the one you see here.

What's next at FLAAR ?

Our report on Caldera RIP is being updated. We are receiving more training on the HP latex ink printers, since more people are writing asking FLAAR about this ink than we anticipated. FLAAR was initially trained on HP latex ink first in Israel and then at the world headquarters of Hewlett-Packard wide-format printers in Barcelona (all before the printer was even released to the public or shown at any trade show).

To meet Nicholas and ask questions directly, you can attend his lecture at Sign Africa in Johannesburg in early September or at Print '09 in Chicago (Sept. 14th). Or you can make a reservation for consulting with him at SGIA in New Orleans.

If you are in Europe, you can make a reservation for consulting with Dr Hellmuth at VISCOM Madrid, VISCOM Dusseldorf or VISCOM Milano.



[click here](#)

Reality Check

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

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

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Update Policy

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

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

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

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

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

Please Note

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

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

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

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

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

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

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

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Legal notice

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

Advisory

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Results you see at trade shows may not be realistic

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

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

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

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

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

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

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

Factors influencing output

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

Actually you may have people with even more experience than we do, since we deliberately use students to approximate newbies. FLAAR is devoted to assisting newcomers learn about digital imaging 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 lifted by cranes and run over a rough pot-holed highway or kept in smelting heat or freezing cold during shipment.

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

Availability of spare parts may be a significant issue

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

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

Lack of Tech Support Personnel is increasing

The 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 and electronics, will tend to have teething issues. Until the firmware is updated, you may be a beta tester. This does not mean the printer should be avoided, just realize that you may have some downtime and a few headaches. Of course the worst case scenario for this was the half-million dollar Lüscher JetPrint: so being "Made in Switzerland" was not much help.

Counterfeit parts are a problem with many printers made in China

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

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

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

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

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

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

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

Be sure to check all FLAAR resources

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

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

Acknowledgements

With 19 employees the funding has to come from somewhere, so we do welcome project sponsorship, research grants, contributions that facilitate our educational programs, scholarships for co-op interns and graduate students, and comparable project-oriented funding from manufacturers. The benefit for the end-user is a principle called academic freedom, in this case,

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

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

Besides, it does not take any money to see which printers and RIPs

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

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

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

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

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

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

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

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

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

Barbieri electronic (color management), Caldera (RIP), ColorSpan, DEC, Durst, EskoArtwork, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Dilli, GCC, NUR, Oce, Shiraz (RIP), Sky AirShip, Sun, Teckwin, VUTEk, WP Digital, Xerox, Yuhan-Kimberly, Zund have each brought FLAAR staff to their headquarters and printer factories. Bordeaux, InkWin and Sunflower ink have brought us to inspect their ink manufacturing facilities and demo rooms. We have visited the world headquarters and demo rooms of HP in Barcelona and received informative and helpful technology briefings roughly every two years. We are under NDA as to the subjects discussed but it is important that we be open where we have visited. Mimaki Europe has had FLAAR as their guest in Europe to introduce their flatbed UV printer, as have other UV-curable manufacturers, again, under NDA as to the details since often we are present at meetings where unreleased products are discussed. Xaar has hosted an informative visit to their world headquarters in the UK. You don't get this level of access from a trade magazine writer, and I can assure you, we are provided much more detailed information and documentation in our visits than would be provided to a magazine author or editor. Companies have learned that it's a lot better to let us know up front and in advance the issues and glitches with their printers, since they now know we will find out sooner or later on our own. They actually tell us they realize we will find out on our own anyway.

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

Improved Technologies (ITNH) providing their Ixia model of the Iris 3047 giclee printer.

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

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

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

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

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

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

So it's obvious that providing products or even a grant is no shield from having your products fail a FLAAR evaluation. The reason is clear: the end user is our judge. The entire FLAAR service program is to assist the people who need to use digital imaging hardware and software. If a product functions we find out and promulgate the good news. If a product is a failure, or more likely, needs some improve-

ment in the next generation, we let people know. If a product is hyped by what an informed user would recognize as potentially false and misleading nonsense, then we point out the pathetic discrepancies very clearly.

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

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

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

Grant funding, sponsorship, demonstration equipment, and training are supplied from all sides of the spectrum of printer equipment and software engineering companies. Thus, there is no incentive to favor one faction over another. We receive support from three manufacturers of thermal printheads (Canon, ColorSpan and HP) and also have multiple printers from three manufacturers of piezo printers (Epson, Seiko, Mutoh, and Mimaki). This is because piezo has definite advantage for some applications; thermal printheads have advantages in different applications. Our reviews have universal appeal precisely because we feature all competing printhead technologies. Every printer, RIPs, inks, or media we have reviewed have good points in addition to weaknesses. Both X-Rite and competitor GretagMacbeth provided spectrophotometers. Again, when all sides assist this program there is no incentive to favor one by trashing the other. Printer manufacturer ad campaigns are their own worst enemy. If a printer did not make false and misleading claims, then we would have nothing to fill our reviews with refuting the utter nonsense that is foisted on the buying public.

It is not our fault if some printers are more user friendly, print on more media than other brands. It is not our fault that the competing printers are ink guzzlers, are slow beyond belief, and tend to band or drop out colors all together. We don't need to be paid by the printer companies whose products work so nicely in both our universities on a daily basis. The printers which failed did so in front of our own eyes and in the print shops of people we check with. And actually we do try to find some redeeming feature in the slow, ink gulping brands: they do have a better dithering pattern; they can take thick media that absolutely won't feed through an HP. So we do work hard at finding the beneficial features even of printers are otherwise get the most critique from our readers. Over one million people will read the FLAAR Information

Network in the next 12 months; 480,000 people will be exposed to our reports on wide format printers from combined total of our three sites on these themes. You can be assured that we hear plenty of comments from our readers about which printers function, and which printers fail to achieve what their advertising hype so loudly claims.

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

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

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

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

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

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

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

A modest portion of our income comes from our readers who purchase the FLAAR series. All income helps continue our tradition of independent evaluations and reviews of inkjet printers, RIPs, media, and inks.

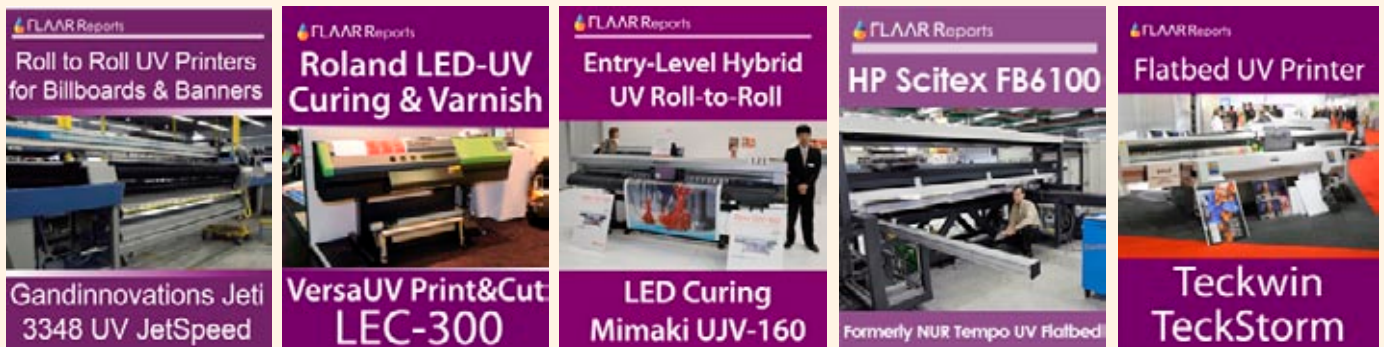
These are some of the most
Recent FLAAR Reports (2007-2009)

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Introduction to UV Curable Inkjet Flatbed Printers



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

<p>Trends in UV Flatbed Printers documented at DRUPA 2008</p>	<p>UV Printers Trends 2008 SGIA '08 PART I</p>	<p>Flatbed & Roll-to-Roll UV Printers SGIA '08 Part II</p>	<p>Chinese-Made UV Flatbed Printers Shanghai '08 Trade Show</p>	<p>UV Printer TRENDS VISCOM ITALY '08</p>
<p>Trends in UV printers at VISCOM Germany 08</p>	<p>TRENDS, Part II: <i>Markets & Technologies</i> UV-cured printers at ISA 2009</p>	<p>TRENDS, Part I: <i>Analysis One by One</i> <i>of the UV-cured printers</i> ISA '09</p>	<p>UV Market TRENDS Observable at FESPA Digital Europe 2009</p>	<p>TRENDS in 2009 Analysis One by One of the UV-cured printers at FESPA Digital Europe</p>
<p>TRENDS of UV-Cured Wide-Format Printers Shanghai '09</p>	<p>UV COMBO FLATBEDS Shanghai 2009</p>	<p>TRENDS IN HYBRID STRUCTURE UV PRINTERS Shanghai 2009</p>	<p>UV Roll-to-roll Observable at Shanghai 2009</p>	<p>UV Flatbed Printers at APPPEXPO, Shanghai '09</p>

UV Printers Manufactured in China, Korea and Taiwan

<p>Chinese UV Inkjet Printers 2009 Comprehensive FLAAR Inventory</p>	<p>Chinese UV Inkjet Printers 2008 Comprehensive (Complete) FLAAR Inventory</p>	<p>UV Printers Manufactured in Korea 2009 Trends, Markets & Applications</p>	<p>UV Printers Manufactured in KOREA 2008</p>	<p>List of UV Printers Manufactured in Taiwan 2009</p>
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