

High-End Combo UV Printer



Polytype Virtu RS25 & RS35

Contents



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THE BASICS	1
PURCHASING	3
FEATURES OF THE PRINTER: Vacuum	3
STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path	5
STRUCTURE OF THE PRINTER (if a combo style): Transport Belt	6
LINING UP FLAT MATERIAL (to help it feed straight)	8
FLATBED ASPECTS (for dedicated flatbeds)	10
ROLL-FED	10
STRUCTURE: Miscellaneous	14
ACCESSORY TABLES (front and back) for Combo or Hybrid Flatbed	14
UPGRADES, Future Improvements?	17
Miscellaneous	17
OPERATING THE PRINTER	18
CONSTRUCTION (BUILD QUALITY)	20
AESTHETICS	22
SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS	22
INSTALLATION OF THE PRINTER	24
INSTALLATION OF THE PRINTER: INSTRUCTIONS & MANUALS	24
TRAINING	25
TECH SUPPORT & WARRANTY	26
CLEANING & MAINTENANCE NEEDS	27
MAINTENANCE	28
SAFETY & HEALTH CONCERNS	30
PRINTHEAD TECHNOLOGY	32
PRINTHEAD DPI & Features	32
Bi-DIRECTIONAL VS Uni-DIRECTIONAL PRINTING	33
PRINTHEAD Positioning	34
PRINTHEAD: Associated Features	34
PRINTHEAD Life Expectancy	35
PRINTHEAD CARRIAGE and GANTRY	35
MOTORS: Stepper, Linear, Magnetic ?	36
SUBSTRATES	36
LOADING MEDIA	36
SUBSTRATES, Materials, Applications, and Issues	38
SUBSTRATES: Cleaning, Priming, Preparation	43
WHAT IS THE INTENDED MARKET FOR THIS PRINTER?	44
APPLICATIONS	44
INK	50
INK: White & Varnish	50
INK Cost	51
INK: Supply System, Tubing, Filters, etc	51
INK Color Gamut	53
THE UV CURING LAMPS	57
UV CURING, and ODOR of the printed image	58
UV LAMPS: Cooling	58
RIP SOFTWARE & Printer Software	59
PRODUCTIVITY & ROI (Return on Investment)	59
COMPARISONS WITH OTHER PRINTERS	59
CONCLUSIONS	60

Polytype Virtu RS25 & RS35

(previously WP Digital Virtu RS25 & RS35)

I was present at the DPI show in 2001 (Atlanta) when the first Virtu UV printer was introduced. This was a printer whose development budget was close to unlimited. Over the years L&P began to have their Swiss subsidiary (Spühl) manufacture a similar but slightly more sophisticated version of the Virtu. Not surprisingly the Swiss version gradually outsold the US version 3 to 1.

Then in late 2008 the combined Swiss company WIFAG plus Polytype bought the rights to the Virtu technology. They intelligently closed the US factory and concentrated all R&D in their Swiss facilities.

I inspected the Swiss factory in May 2008 and the US factory a few months later. In February 2009 it was possible to spend three days at WP Digital world headquarters in Switzerland (so my second visit there). The present report is based on the combination of the three visits: USA plus twice in Switzerland). Plus I have spoken over a several month period with the contented owner of an L&P version in Florida.

THE BASICS

1. Brand name, model?

The brand name is Polytype Virtu. The four different models are listed below.

2. If there are two or three (or more) widths of this printer, what differences exist other than the width?

There are two models (widths) with two variations each:

Model	Media Width	Number of Printheads	Ink configuration
WP Digital Virtu RS25/36	2500mm	36	CMYK, Ic, Im or CMYK + 2W
WP Digital Virtu RS25/48	2500mm	48	CMYK, Ic, Im + W
WP Digital Virtu RS35/36	3500mm	36	CMYK, Ic, Im or CMYK + 2W
WP Digital Virtu RS35/48	3500mm	48	CMYK, Ic, Im + W

Polytype is the new company name formerly known as WP Digital. Because this report was written during the WP Digital era, the old name gets mentioned throughout the text, but further updates will refer to the company as Polytype

So, besides width, the main difference is that on the /48 version of each width you can print with up to 6 colors plus white, whereas the /36 version you can print either with 6 colors or 4 colors plus white. Also, on the 2.5 meter printer models you can order a special table for feeding multiple boards.

At FESPA Munich 2010, the company launched the Virtu RS35/48/10, which is a faster version of the original RS35/48. The main difference is that the newer model uses Spectra QS 256/10 heads. The options of the original model will be explained further on in the Printhead section.

3. What is the nature of the company? Is this company the manufacturer, distributor, or rebranding a machine made by someone else?

WP Digital is the designer of the Virtu printers manufactured by Spühl in Switzerland. WP Digital (now Polytype) does not own Spühl, they own the rights to the former digital printers only. The factory itself is still owned by Spühl.

4. Is this same model(s) rebranded and sold under other names?

These Virtu printers are not rebranded by any other company.

5. When and where was this model first introduced?

We saw this printer for the first time at FESPA '07, in Berlin. I have visited the factory in Wittenbach twice, one the day after FESPA Digital 2008; a second time in late February 2009.



6. What is the history of the development of this printer?

This printer was originally designed and manufactured by Spuhl—the Swiss version of Leggett&Platt—when WP Digital bought the company. WP facilities are adjacent to the former building of Spuhl. But since late 2008 all design and development is done entirely by WP Digital. Only the final manufacturing is next door in the factory of Spuhl.

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

“We were looking to build a flexible machine, where the customer is able to print RtR as well on rigid materials. Therefore we are the only manufacturer of a true dedicated flatbed combined with a 3,5 meter roll to roll.” Editor’s comment: No other combo UV printer in the world can print on the transport table in both X and Y directions.



The tables are some of the optional accessories.

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

This printer has been shipping for ample time so that it is definitely out of beta-stage.

9. List price?

Prices for the RS35 range from €400,000 to €490,000. For the RS25 price varies from €300,000 to €390,000.

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

You can order an oven if you intend to print on textiles. You can order 30 or 80pl printheads at no extra price. The software has options. The anti-static bar, a camera to see inside the printer and the feeding tables are also extra accessories. The price may vary according to the features you choose.

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?

Yes. The printer comes with a full set of 5lt. tanks at a special price.

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

Electric power and compressed air are required.

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

The printer comes with a UPS. This is one of the few printers where this is included and not sold as an option.

14. 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?

No, because the printer has a special feature inside of the printhead system.

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

There are two vacuum systems already inside the printer.

16. 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.

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

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

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

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

PURCHASING**18. 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?**

WP works direct, with dealers in a few countries or agents. But the customer can always go direct to WP Digital.

FEATURES OF THE PRINTER: Vacuum**19. Is there a vacuum function?**

Yes. There is a sophisticated vacuum system.

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

Vacuum is created by air pumps.

21. If pumps, how many pumps are there?

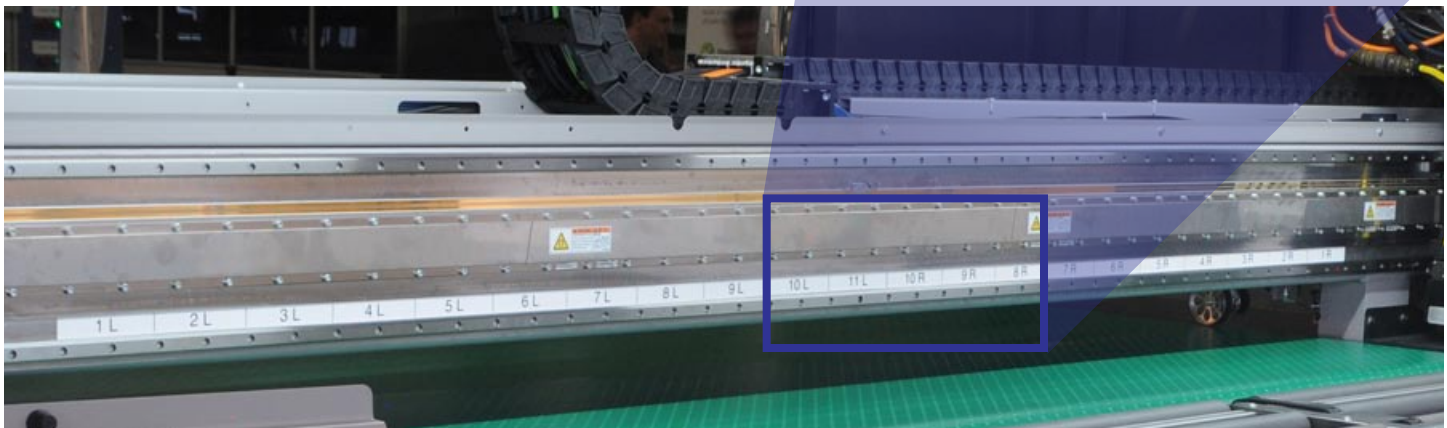
The printer comes with two air pumps, a full pump, and a less strong pump, but you can order two strong pumps. However, if you choose to order two high vacuum range pumps, the power (or strength setting) of these must always be identical.

22. In how many sections?

31 sections for the RS35 version and 25 for the smaller RS25 version. There is no need to put paper on top of the vacuum holes in most cases. How do you know what vacuum section you need to turn on? Well, if you notice on the edge of the bridge, there is a stripe that indicates the vacuum sections.

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

There are pre-defined areas but in a flexible manner.



Vacuum sections are indicated in the bridge.

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

Both vacuum pumps can be adjusted independently of one another. You adjust the strength of the vacuum via software.

The data is shown in percentages of vacuum performance.

25. Just Off and On? Or variable?

Once the vacuum is on, you can vary the intensity from 5% to 100%. The reason why you can vary the intensity of the vacuum strength is because there are some rigid materials whose edges are not straight but wavy. Media with irregular edges do not adhere to the belt properly, causing feeding problems. A stronger vacuum on the edges solves this problem.

The manual advises to use the least possible vacuum strength. This minimizes stress in the transport belt and transport belt drive roller.

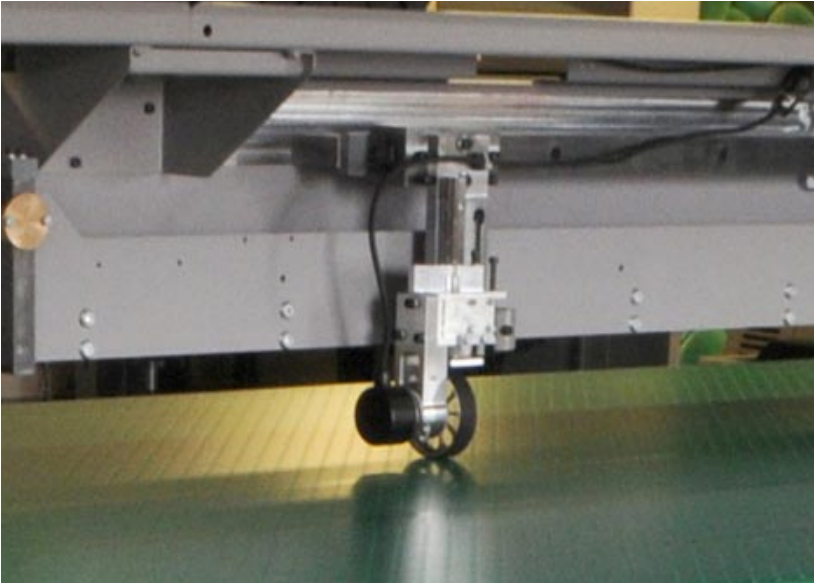
26. Is the vacuum too weak for some materials? Does this mean you have to waste your time and tape materials down to the top of the flatbed table?

Virtu models tend not to have problems handling most materials due to their vacuum power that is adjustable and the lack of the pressure rollers in handling the material.

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.



The WP Digital Virtu RS35/48 has vacuum sections. Here you can see the vacuum controls.

STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path

The encoder wheel measures the media transportation.

27. 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?

The advantage of WP Digital combo machine is that In Roll to Roll mode and in Hybrid mode (Rigid material printing in width of more than 1.2m) the material is advancing in very accurate steps through encoder measurements and bridge corrections. There are no more gaps in the prints or overlaps due to irregular material transportation.

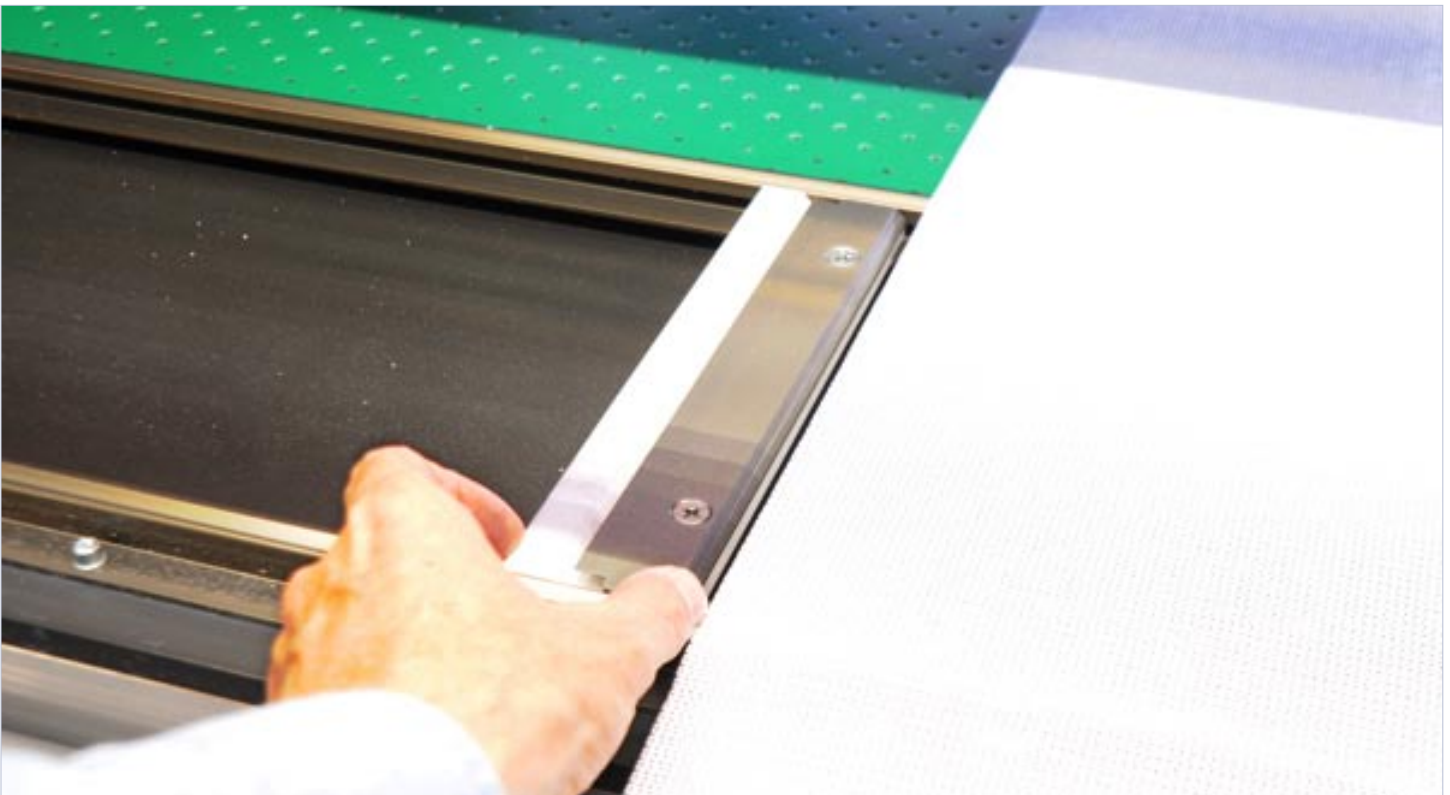
Just realize that the best machine to print on flat material is a dedicated flatbed and the best printer to print on roll-fed is a dedicated roll-to-roll. The advantage of a combo printer is that it can print on both flat and rigid and roll-fed material. But no joint-use printer can print on all materials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

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

This is a combo style printer.

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

Retention clamps pushed into the side of the guide elements ensure that the material edges do not raise up.



Edge guard for roll-fed materials.

STRUCTURE OF THE PRINTER (if a combo style): Transport Belt**30. Can the belt move forwards and backwards, or only forwards?**

Not intended to move belt backward: but you can scan 300%.

I only began to ask this question when I learned that the transport belt of the Sun Neo LED Evolution could go either forwards or backwards. The reason on that printer is because the white ink heads are set behind the others. So if you want to do a pre flood coat you print in one sequence; if you need to do a post white ink layer, you move the material in the opposite direction.



Flat media is held by the vacuum that functions through the transport belt.



Another view of the transport belt.

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

Two rollers.

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

The IP&I Revo has three rollers, as does the new Shark from Grapo. The IP&I Cube260uv has four rollers that control the transport belt. This adjustment and alignment control system on the IP&I Cube UV printers is the most sophisticated I have yet noticed.

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 it's 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.



As you will see later on in this report, the transport belt has a horizontal path, and it is moved by the two rollers.

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

There are sensors that control the the skew of the belt. The sensors tell if the belt has skewed 1/2mm to the left or right.

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.

34. If a combo-design, with a conveyor belt, does the texture of the belt, with a heavy vacuum, leave a banding imprint on the surface of any thin lightweight material?

Yes. In general, the manual advises to use the lowest possible vacuum strength for thin materials, since the texture of the belt may create an imprint on the surface of the media if the vacuum is too strong.

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

This is a new printer and so far there hasn't been a transport belt that fails, but the replacement is €12,000 (between € 8,000 -12,000; it includes labor, etc.).

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?**

Rigidmedia is fed in the traditional way; you manually place the board.

37. Is a feeder-stacker option available?

A semi automatic feeder is available

38. Are there specially accessories on or above the side guides, or are they just a raised guide.

The machine is equipped with 3 length measuring devices.

The length measuring devices (one sensor and one calibrated ruler, respectively) are attached to the right and left of the machine base and measure Y-direction movements.

Another length measuring device (two sensors and one calibrated ruler) is mounted on the bridge and measures x-direction movements.

These accessories make it possible to move the printhead carriage and the bridge with absolute precision even at maximum acceleration values.

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

The printer has an optional Stop System. This mechanism allows one or more sheets to be inserted and positioned adjacent to each other with absolute precision.

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.



As discussed earlier, this is a combo printer. The advantage of this type of printers is that it handles rigid and roll-fed media.



The front table is a sophisticated structure that has adjustable edges to align multiple boards of rigid media.

FLATBED ASPECTS (for dedicated flatbeds)

54. How much weight can the table hold?

The table can hold 50Kg per sq. meter.

55. Is pin registration present? How many pins? What is their position(s)?

Pin registration is normally present only on a dedicated flatbed, not on a moving transport belt. Just realize that not all sheets of rigid material are themselves actually perfectly rectangular!

56. What are the pros and cons of a dedicated flatbed compared with a combo printer (with moving transport belt) or hybrid printer (with platen)?

But even dedicated printers have their downsides too; with a dedicated flatbed you (the operator) are idle, totally, while the printer is printing. You can't load or unload anything (except on some of the newer million-dollar printer systems). But if you have a top-of-the-line combo printer, such as the Durst Rho 700 or 800, you can load at the back while the printer is cranking the previous job of flat material out the front: this can print and load and unload all at the same time. I have seen this ability to feed-while-printing also with the ColorSpan 9840uv (HP Scitex FB910).

But with a dedicated flatbed printer, there is less alignment issue just because the media is not cut squarely from the factory. Poorly cut material is a major disadvantage for combo or hybrid printers. So again, the reason there are more than four different classifications of UV printers (hybrid, combo, dedicated flatbed, dedicated R-t-R) is because each has pros and cons.

In theory, the perfect printer would be a dedicated flatbed with a dedicated roll-fed system across the long axis. Océ is the first with a functioning version of this double concept. (Gerber unfortunately is doing all their printing across the short axis).

ROLL-FED

41. How is media held flat? Vacuum table? Pinch rollers?

Media is held flat by a vacuum system which has multiple areas. There are two pumps for the vacuum.

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

Flexible materials are fed by the movement of the two spindles (the bar which transverses the core of the roll of media) and are held flat by the vacuum. Netted materials (mesh, textiles, etc.) do not require a vacuum and are transported only with the aid of the pressure roller.

43. If there are no pinch/grit rollers, is the media held by tension?

Besides the vacuum function, there is a pressure roller at the back that moves the substrate with minimal slack. The pressure of this roller can be adjusted to the tension requirements of each substrate.

At the back right you will find a toggle to adjust the pressure of the roller. There is also a valve to open and close the pressure roller.

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

Roll-fed media is held by a spindle.

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.

45. Is there an air (pressure) core system?

Yes. Air core spindles tend to be used only on grand-format printers costing over a quarter of a million dollars.

46. How is the roll media handled at feeding position? For example, is there a dancer bar? If there is no dancer bar, is there at least a tension bar?

There is no dancer bar, and no tension bar. Roll-fed media goes from the spindle (or feeding bar) and rolls over a roller located in front of the transport belt, then moved by the latter into the printing area.

A tension bar goes up and down. A dancer bar tends to move diagonally. Each one changes position as tension is needed.

47. Is the feeding area for roll-fed material physically attached to the printer or is it out in front and not attached (as on the GRAPO Octopus).

The roll-fed system is attached to the printer.

Skew is a common downside of a conveyor belt transport system. The reason is because the belts are flexible. To some degree the flexibility is inherent, since most belts are woven material. The heat will also cause the belt to become flexible. These aspects are not specific to Grapo but are one of the pros and cons of the combo transport belt system.

As a result Grapo learned that it is actually more practical to have the media roll out in front of the printer rather than the roll-fed mechanism being bolted to the front of the printer. If the roll-fed system is rigidly affixed to the front of the printer, and has no manner of fine-tuning the position of the feeding rollers, after many months the rolls may not be 1000% parallel to the transport belt. By having the roll-fed mechanism free, and movable, you can allow the paper to feed itself in a parallel manner.

Plus, the movable roll-fed unit allows you easily to move your media around and change media (if you have a second roll-fed unit you can simply switch the entire unit rather than having to off-load and on-load a different kind of substrate.



The roll is held by a spindle, which is supplied of pressured air with a pistol to tighten the core of the roll.

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

Before reaching the transport belt, media goes to a roller that is in front of the transport belt.

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

The manual advises that, if you have already loaded a roll of material, you can fasten or tape the edge of the new roll to the old substrate so that you can take the most out of your new roll of media. But the advantage of the movable bridge and loading system in WP Digital RS machines is that the printing can start from the very edge of the material in roll-to-roll mode, thus, the waste of material is minimized dramatically.

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

The amount of waste also depends on whether you need to attach the leading edge of the media to the take-up spool, or whether you can simply leave the leading edge up on the platen or up on the conveyor transport belt (as is possible on the Grapo Octopus II and some other combo printers).

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

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.

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

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

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

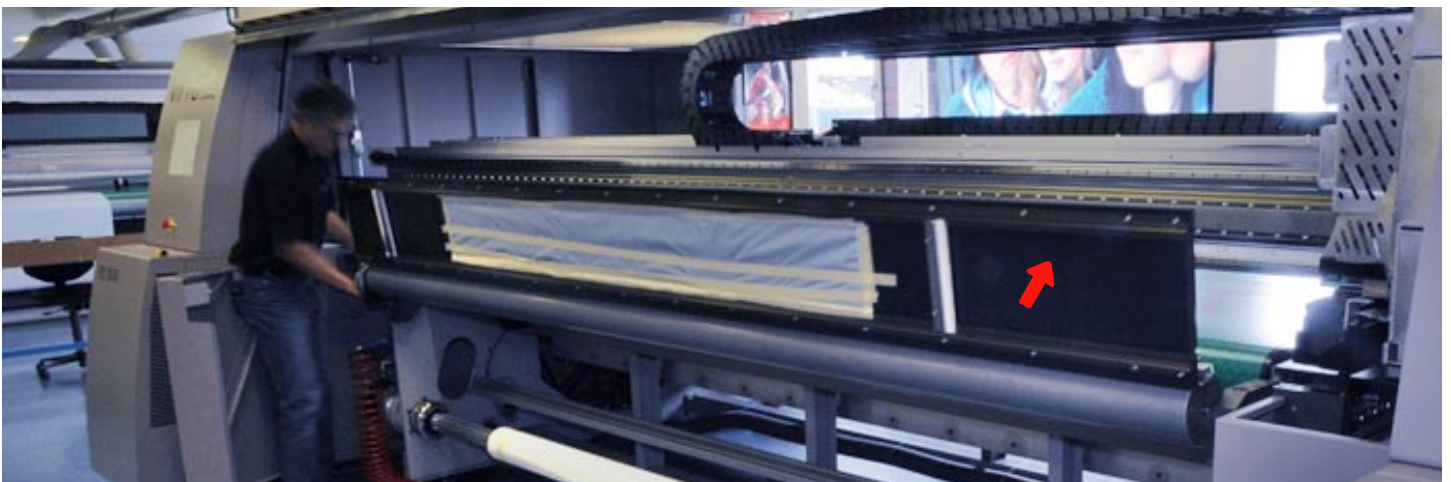
Most combo-style printers have no area to put such a knife slot.

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

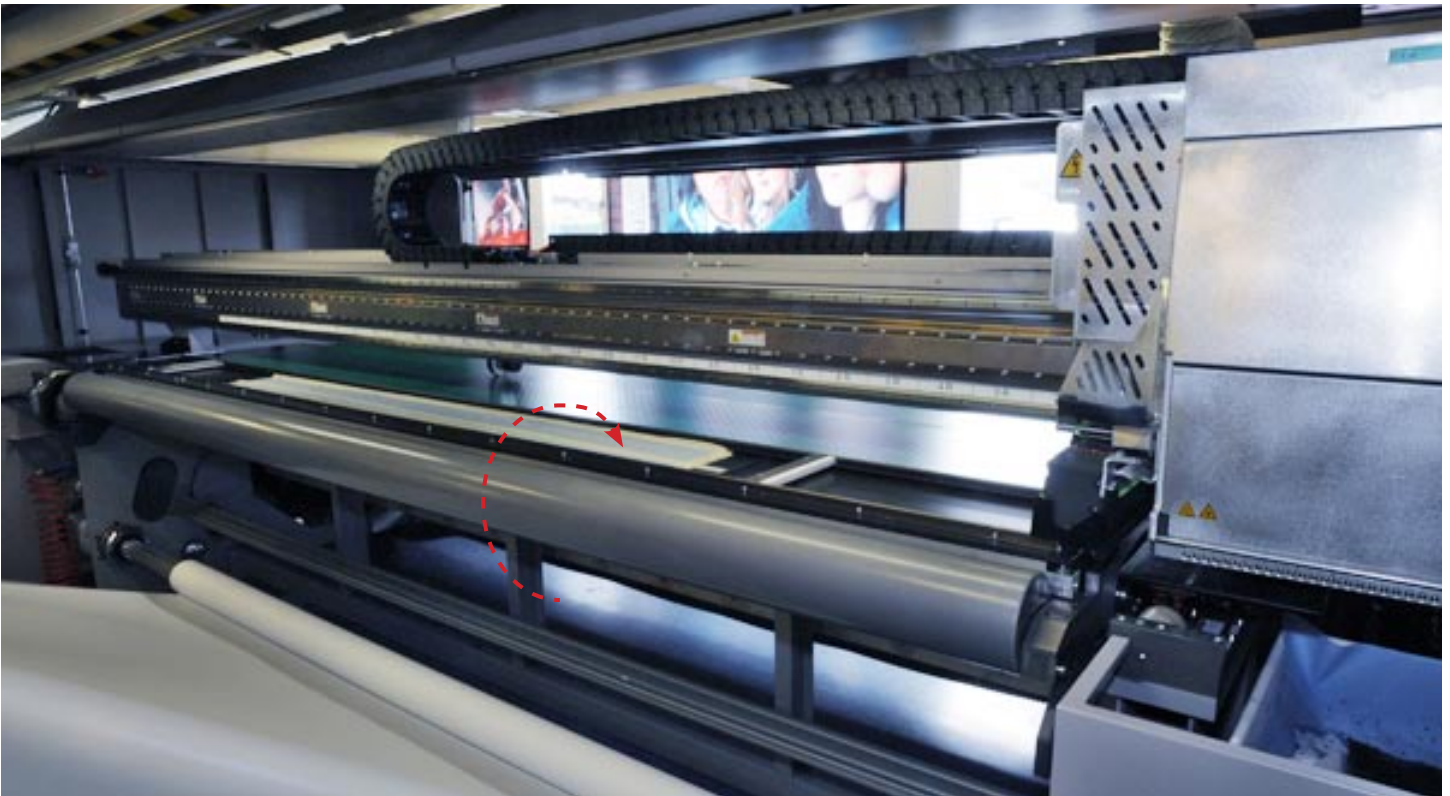
Yes. There is a trough that can be swiveled upwards when needed, and back downwards when you finish printing textiles, mesh and other open substrates. This feature is one of the advantages of the printer over other comparable brands.



In the following sequence you can see the movement of the trough



The trough captures the ink when you print on textiles, mesh and similar media.



Here you see the full rotation path of the trough.



This is the handle to move the trough.

STRUCTURE: Miscellaneous**57. Does the printer have levels built into the structure of the printer?**

No.

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.

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

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

59. Do the wheels have a lock on them?

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**60. What is the approximate size of the table?**

2.5 x 1.2 m. and 3.5 x 1.2 m.

61. 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.

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

If you intend to print on long rigid substrates it would be advisable to have extra tables.



The tables are optional accessories. They are the full width of the print area.

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

Yes, front and rear tables are an optional accessory.

64. 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 horizontal roller bars with rigid supports.



The table is designed with horizontal rollers that are held by intermediate bars. It has a measuring stripe (a) along the front edge.

65. If there is a row of rollers set into a bar, can you slide the individual bar to a new position?

It is rare that you can slide any individual bar, or roller, to a new position. The only table that I can remember that had movable features was that on the ColorSpan 72UV printers.

66. Are there any special rollers to assist moving a large heavy flat material from left-to-right to help align its edges?

The Durst Rho 700 has a special set of black “wheels” on the feeding-side table. These can be moved into action with a crank. The purpose of these free-spinning wheels is to allow you to move a heavy material over to the right edge of the feeding table to align the material with the raised alignment bar.

67. Does the table stick out with cantilever support only? Or does the front have legs for added support?

The tables are attached to the printer and are supported with legs. There is no cantilever support but there is a mechanism to fold the table down.



The table is designed so that you can fold it downwards. As you can see, both front and rear tables are physically attached to the printer, but they are also easily detached to set the printer in a roll-to-roll mode.

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

The tables were designed to be sturdy structures of four legs.

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

The tables have wheels and leveling systems.

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

The minimum board size for the RS25 and RS35 is 297 x 420mm (A3).



The tables are four-leg strong structures appropriate for the size of the printer.

UPGRADES, Future Improvements?

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

There have been a lot of modifications. The 2 vacuum systems have been changed. The printer now comes with ink tanks; this means you can refill the tanks without having to stop the printer

72. What features have been added in the last six months?

The firmware has been improved.

73. What firmware upgrades have been made available?

There is a new software with job queue.

Miscellaneous

74. What moves:

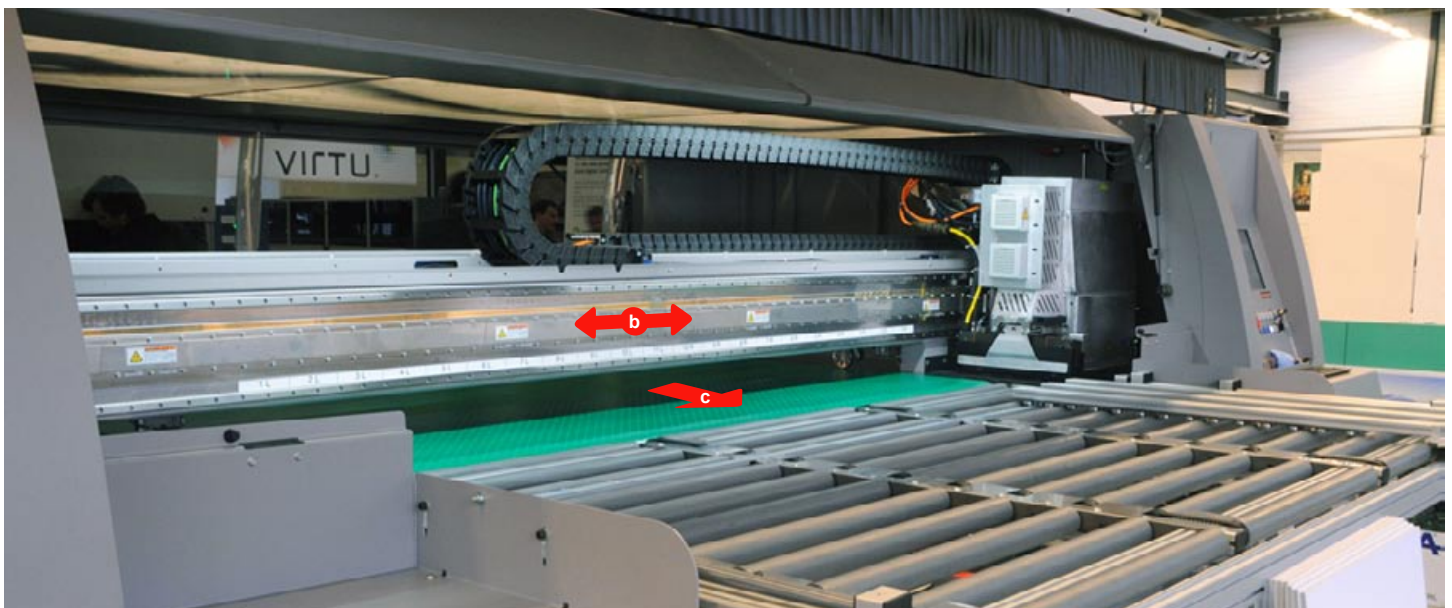
- the flatbed platform,
- the printhead area,
- only the material (fed by roller table; then gripped and fed by the printhead area mechanism as on a regular printer; or both?)

This is a combo printer. So, media is moved by the transport belt while the printhead carriage travels back and forth over the rail or bridge.

When you print in Roll-to-Roll mode (Y mode), the bridge remains in the selected position (stationary bridge) while the printhead carriage travels in X-direction. Roll-fed media is moved in Y-direction.

When printing in the Rigid mode (XY mode), the entire bridge travels along the Y axis across the board, and the printhead carriage travels back and forth along the X axis. In this mode the transport belt does not move at all; so the result is a dedicated flatbed printer. Currently, no other UV printer offers this option: XY printing on request.

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.



The printhead carriage moves in X-direction (b). If you print on Roll-Fed mode, the bridge is stationary. If you print on Rigid mode, the bridge will move to the far back and begin to move forwards (c) as the carriage travels from left to right.

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

Yes, the printhead carriage can hover. 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.

76. Does this printer offer "skip white space" option?

Yes.

77. Is there a light inside when you open the hood?

Yes.

OPERATING THE PRINTER

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

No. But you can remotely diagnose the printer.

79. What sensors does the printer have?

There are ink level sensors in the tanks and in the printheads, there is a sensor that measures the tension of the media in the roll-to-roll system. There is a sensor that measures the alignment of the transport belt.

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

The main control area has touch screen controls and keyboard controls. Some functions are both on the touch screen and physical buttons.

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.

81. 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 17" monitor.

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

No. The monitor is physically mounted on the printer. It is not movable.



The main control area is at the right. The LCD monitor is fixed into the printer. It is not movable.

83. Where does the computer keyboard sit?

In the main control area, on a ledge just below the monitor.

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

Yes, the keyboard can be moved.

85. Is there a drawer under where the computer keyboard is (a drawer for storing odds and ends)?

No.

86. Is there a ledge or other space where the operator can park tools, cleaning liquids, iPod or other accessories?

Increasingly too many UV printers have slick exterior skins. They look like a designer style, but are impractical because there are no ledges for storing cleaning fluid, wipes, Coca-Cola cans or coffee mugs, etc.

87. Where does the operator stand or sit?

At the front right.

88. What controls are on either end?

There is absolutely nothing on the ends of the printer, except for the cabinets.



The computer keyboard sits on a ledge located just below the main control area.



You will not find any control or button at the sides. Only the cabinets.

89. Is a foot pedal included (for operating aspects of the printer)?

No.

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

One is enough, but it helps to have a second person to load media.

91. Is there a pole with beacon lights?

No. 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)**92. When designed, what is the life-span that each part is tested for?**

The life-span varies according to what part you talk about. It depends on whether it is electronic or metal, moving or stationary.

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.

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

The printer has Plexiglas windows. The framework is made of sturdy metal. Due to a very rigid built chassis, very precise linear servo systems the Virtu RS35, in the rigid mode of printing, is obtaining a very precise start positioning within 20microns. This is an advantage in rigid mode when one is considering printing on both sides of a material (a perfect cut substrate is recommended) or when different ink layers are considered to be printed (mesh on glass).



The solid framework makes this a sturdy printer.

Due to the precise encoder wheel in roll to roll and hybrid mode, the accuracy of printing is falling within the same 20 micron. This accuracy is influenced by the flexible material properties.



Dr. Hellmuth inspects the assembly of the printer. FLAAR gets documentation from first-hand experience at factories and demo rooms.

94. Is there a hood?

Yes, (contra UV light) tinted Plexiglas windows.

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 cheaper 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).

95. Is there both a front opening for the hood and a back opening?

Yes, the printer has hoods, one on the front and one on the back, both are made on Plexiglas.



UV light is shielded by Plexiglas tinted windows at the front and back.



Here you see the hood at the back.

96. The hood opening, is it strong, or cheap plastic?

Both hoods are thin but strong.

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

The overall workmanship of visible parts is Clean (Swiss made).

98. Does the printer wobble back and forth when printing?

No, it does not. Being a high-end industrial printer does not guarantee there won't be vibration. We saw how a Gandinnovations Roll-to-Roll UV printer wobbled while printing in the demo room. It was especially notorious if you stared at the LCD monitor.

AESTHETICS

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

The design can be described as clean and sophisticated.

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

Not really, because the front and the back are very similar.

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.

SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS

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

10 to 12 weeks.

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

Yes. Vapors and misting need to be dissipated by a ventilation system.

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

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

To avoid malfunctions, the machine should be operated at the following ambient conditions:

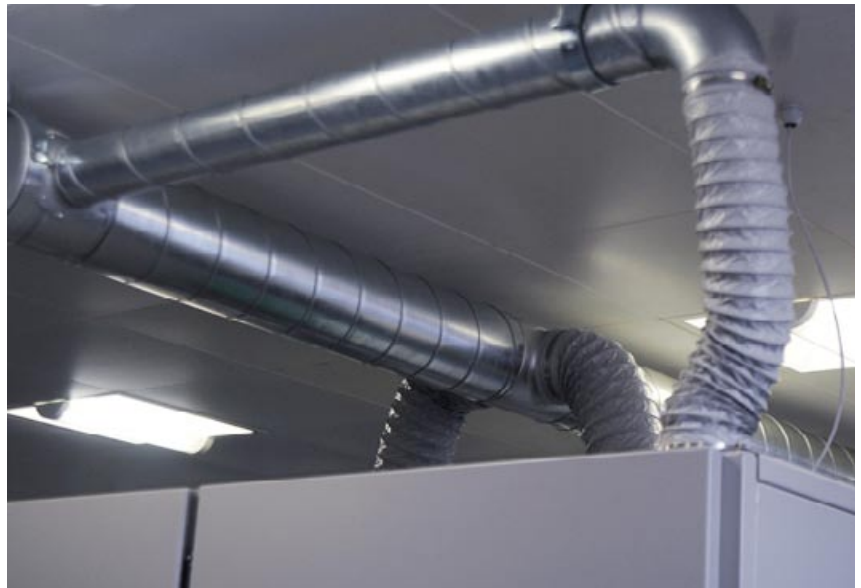
	Maximum range	Ideal range
Room temperature	10 to 30 °C (50-86 °F)	18 to 24 °C (65-75 °F)
Relative humidity	30-80 %	45-60 %

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.

104. What about altitude? Some cities such as Guatemala City are at a high altitude?

A system measures local conditions and then adjusts itself.

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.



You can see a whole exhaust system installed on top of the printer.

105. 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.

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

Network and USB 2

107. What air pressure is required to be provided to the printer? Is this for a vacuum table, or other purposes (such as ventilation)?

The pneumatic system is required for a number of primary functions and is a basis various secondary functions.

The pneumatic system must be in a position to reliably supply the printer at all times with at least 6.0 bar (87psi), even when the machine is turned off.

Air is used in the pneumatic panel that contains all the regulating and control components required for the optimal operation of the printheads.

The "lung" vacuum removes the remaining air bubbles from the ink, ensuring color applications.

There is an air system to cool the UV lamp system.

108. What space is needed to accommodate not only the printer but everything else to make the printer fit into your workflow?

For the WP Virtu RS25 you have to have an open space at least 8.0 m long, 8.0 m wide and 2.7 m high (315 x 315 x 106 in).

For the WP Virtu RS35 you have to have an open space at least 9.0 m long, 9.0 m wide and 3.0 m high (354 x 354 x 118 in).

WP Digital manual has a diagram of the recommend arrangements and recommended dimensions.



You need to consider not only the space to the printer itself, but also the realistic space to handle long rolls or large boards of media.

109. Does the printer come in one piece? Does this mean you have to remove a wall to get the printer into your office?

The machine is delivered in the following machine groups (assemblies):

- Complete printing machine
- Complete right-side control cabinet
- Complete left-side control cabinet
- Center section housing consisting of top and front/rear doors
- Water cooler

Every door and every passage must be at least 2.5 m wide and 2.2 m high (98 x 87 in) to be able to transport the unpacked units.

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

Model	Width (length) cm (in)	Breadth cm (in)	Height cm (in)	Total Weight Kg (lb)
Virtu RS25	530 (209)	322 (127)	200 (79)	5625 (12401)
Virtu RS35	630 (248)	322 (127)	200 (79)	6875 (15157)

INSTALLATION OF THE PRINTER**111. What size and kind of forklift truck do you need? Or do you need a crane?**

You will need a 5 tons forklift truck.

112. 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.

113. Can you install this printer yourself?

Due to the complexity of the printer, you will need qualified staff to come install the printer.

114. Is installation included in the purchase price?

Yes, included are three weeks, one week for training at WP, one week for installation and one more to make sure things work.

115. How many people come for the installation?

One person normally, he installs and trains.

116. Do people also come for a pre-installation site inspection? Or is the inspection just a form sent in by e-mail or fax by the print shop to the distributor? From the factory or from the distributor or from the dealer?

By internet.

INSTALLATION OF THE PRINTER: INSTRUCTIONS & MANUALS**117. How many manuals are available?**

Two, one for maintenance and one for the operator.

118. Which manuals are hard-copy? Which manuals are only on CD?

There are electronic copies for maintenance and operator manuals.

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

Yes.

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

The manuals were originally written in German. The translation to English is acceptable, although a native English speaker will notice the text was translated.

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.

121. What kind of cut-away drawings or other drawings exist that show the various parts of the printer?

The manual uses mostly photographs. The drawings are 2-dimensional technical diagrams.

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

There are no manuals on the web site.

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

123. Is training necessary?

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

124. Is classroom training available?

Although, classroom training is not common, WP is making arrangements to have classroom training available in USA.

125. Is factory training available?

Factory training is rare, though some companies do welcome factory visits, and a few companies do indeed offer training at the factory. But WP prefers training in factory, then install the printer and then one more week of supervision during actual production.



WP Digital personnel at the in-house event. The opportunity to learn at the factory is priceless. You don't get trained by an inexperienced dealer, but by the people who know the printer inside out.

126. What on-line training is available?

Fewer than 5% of the UV printer manufacturers offer on-line training. WP doesn't offer on-line training neither.

127. What about follow-up training after you have had the printer a month and know enough to ask better questions?

It is available at extra cost

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

First-time person will take maybe two months to learn the necessary aspects of the printer. If the operator has previously operated another kind of large format printer he or she can probably learn how to achieve spectacular results on the Virtu in a few weeks.

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**129. What is the original warranty period?**

12 months, the normal original warranty period.

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.

130. 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).

131. What are the hours of tech support? If support is from eastern time zone, hours should be at least 8 am through 8 pm to cover users on the West Coast.

From 7 am to 6 pm

132. 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?

You can telephone the manufacturer directly for tech support.

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.

133. Can the manufacturer remotely diagnose the printer?

Yes, they can remotely diagnose the printer.

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

134. Who does repairs? Dealer, manufacturer, distributor, or third-party?

The manufacturer in USA and Europe.

CLEANING & MAINTENANCE NEEDS

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

The cleaning area is at the back, right behind the monitor.

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

Purge with ink and wipe manually.

137. How many levels (strengths) of printhead cleaning (purging and/or sucking) can be accomplished via the firmware (software)?

User definable.

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

Once in morning, unless you have to clean more than what you print.

139. If done with a flush solution, how do you add the flush to the printheads? With a syringe, or a manual button or toggle switch, or automatically with software command, or other method?

With most mid-range UV printers, you manually turn a valve to open the ink lines so that the flush will flow into them. In cheaper printers you have to inject the flush with a syringe by hand.

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

You can purge array or all 3 heads.

141. The ink that is purged, where does it go? Into a drain/waste bottle, or into a drip tray?

The ink goes to a drip tray, there is no bottle.

142. Are there wipers?

No, there are not.

You need to decide if a wiper is as effective as a well trained operator doing a manual wipe with a special cloth. Also, if you don't clean and maintain an automatic wiper it can do as much harm as good.

Wipers are not recommended by KonicaMinolta for their printheads. Mimaki made the mistake to feature wipers for their Toshiba Tec printheads. These wipers (and those heads in general) are one of the causes for issues with the Mimaki JF-1631 flatbed UV printer.

143. Where is the parking area, "home?"

At the front right.

144. Is the service area the same as the parking area?

Yes it is the same.

145. Does this printer spit, or "weep" ("flash") ink at regular intervals?

No automatically. Only if you pause, go park, purge, then go back to printing.

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



The cleaning station is at the front right. The inks that are purged go to a drip tray (d).

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

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

146. Do you need to have a band of printable colors along the edge, outside the main printed area, to keep all print-heads fresh and ready to print (so as not to dry out when not be used by the colors in the design)?

No, you don't need it.

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

You have to do it at the evening to leave overnight.

148. Does the manufacturer provide any special cleaning tools?

Vacuum tubes to suck head but normally with towels. One tank with cleaner liquid, but this is for technical with ink purge out solution.

149. Does the manufacturer provide any special cleaning liquids?

Yes the manufacturer provides cleaning liquids to put on wipe.

150. Does the printer itself have a wiper (a blade)?

There are no wipers.

151. If you need to wipe yourself, manually, is it a dry wipe, or a wet wipe with a solvent or cleaning material?

You need to wipe manually.

MAINTENANCE

152. What daily procedure is required at start up in the morning?

Before beginning the daily work, you must check the following aspects:

- gloves are available in the vicinity of the machines
- goggles are available in the vicinity of the machines
- sufficient clean room cloths are available
- sufficient cleaning agent is available
- sufficient substrate is available
- sufficient ink is available in the containers
- no obvious leaks are visible in the ink delivery system
- the meniscus vacuum settings are O.K.
- the correct job has been loaded
- no objects are located within the travel range of the print head
- the machine is turned on and no error messages need to be resolved. You must take existing error messages seriously in all cases, explore their causes and take the necessary remedial action.
- the correct mode for the job has been selected
- the required options (e.g. furnace) have been activated

Prior to every print job, you must follow these steps:

- Adjust the print head to the correct height above the print substrate.
- Inspect the substrate to be imprinted for uneven areas and if necessary smooth it or remove inequalities.
- Perform an All Jets On check to locate potential jet failures, date it, sign it and attach it to the machine documentation.
- Clean the print modules, using a clean room cloth
- Depending on the state of the print modules, the cleaning step has to be performed dry, with a cleaning agent and/or following a prior purging step.
- Close the protective covers and start the job.

153. What daily maintenance is required if you print the entire day long?

Test whether all nozzles of the print modules are jetting:

- All nozzles are jetting - rinse and clean with a clean room cloth, which has been saturated with the respectively required cleaning agent (depending on the substrate and the ambient conditions this may also required several times a day)
- Check the meniscus vacuum
- Inspect the print head for ink leaks and remedy if necessary
- Inspect the water circuit for leaks and remedy if necessary
- Inspect the ink tank for fill level
- Inspect the water level in the cooler, if necessary replenish
- Clean the print head plate with cleaning agent
- Clean the conveyor belt on the vacuum table
- Inspect the rollers for pollution and clean if necessary
- Maintain proper condition of the entire printer.
- If the dew point indicator on the diaphragm dryer has a brown discoloration, it means that the oil pollution is too high. In this case, replace the indicator, the diaphragm module and the filters.

154. What other periodic maintenance is required by the operator?

At the end of each print job, you must perform these steps:

- You should wait at least 30 seconds before opening the hoods to allow vapors created during the printing process to be removed.
- Perform an All Jets On check to locate potential jet failures, date it, sign it and attach it to the machine documentation.
- Clean the printheads, using a clean room cloth. Depending on the state of the printheads, the cleaning step has to be performed dry, with a cleaning agent or a prior purging step.

As needed you have to:

- Adjust the meniscus vacuum setting
- Inspect "lung" vacuum for leakage
- Rinse the entire ink delivery system with the new ink (when changing inks)
- Change the ink

155. How often do filters have to be checked? Cleaned? Changed?

Every three months.

156. What would be a "maintenance check list?"

- Check all nozzles with the "All Jets On" function and if necessary rinse and clean them
- Inspect meniscus vacuum and if necessary re-adjust it
- Inspect print head for ink leaks and if necessary eliminate defect
- Inspect water circuit for leaks and if necessary eliminate defect
- Inspect ink fill levels for all colors
- Inspect the water level for the cooling water cooler device
- Clean the print head plate with a cleaning agent
- Clean the conveyor belt
- Inspect rollers for pollution and if necessary clean them
- Restore orderly conditions in and around the printer

157. How do you clean the transport belt?

With special cleaner, or put tape on and then put tape off.

158. How often do you need to clean the transport belt?

You have to clean it daily.

159. What is the most delicate, or complex, or time-consuming cleaning or maintenance chore?

Printhead nozzle plates are fragile. Some manufacturers say never to wipe the actual nozzle plate by touching it. Other manufacturers require that you physically wipe the nozzle plate with a swab. A few manufacturers are unsure and change their recommendations. But no matter that model printer or what model printhead, I would list printhead cleaning as delicate.

160. What is the average number of maintenance calls per printer per year?

One infamous UV printer reportedly had an average of 52 service calls per year.

161. How long can the printer sit unused?

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

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

162. How should a printer be prepared for sitting unused for a long time?

If the printer is not going to be used for a long time, it is recommended to drain all the ink and rinse all the ink lines with the product recommended by the supplier.

Solvent printers need to be used every day. Otherwise the ink dries in the nozzles and nozzle plate of the printheads. It was an early mantra that UV ink escaped all the problems of solvent printers: that you never had to weep (spit at the end of every pass); that you never had to purge; etc.

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

But reflected light can cure the ink inside the nozzles; heat can cause gellation which can clog the heads. So in some printers the heads are capped at night; in some printers you have to fill the ink lines with flush if you don't print frequently. Indeed a UV printer is intended to be used every day. We just received an e-mail from an end-user whose printer had endless issues. He said they used it seldom because of other issues. My first question was whether the infrequent use was a cause of at least some of the issues.

SAFETY & HEALTH CONCERNS**163. How is safety treated in the printed literature?**

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

164. How many emergency stop buttons are there? Where are they located?

3 emergency stop buttons at the front and 3 at the back.



There is one emergency stop button at the far left, another at the left, but closer to the printing area and the one located in the main control area at the right.

165. How much odor is emitted by the photoinitiators or other aspects of the UV-ink or curing process? How much subsequent outgassing is there, and for how long does the stuff smell?

All ink emits odor (even water-based), but if you ventilate the printer and the work area the smell is manageable, for most UV inks. However one or two UV inks have a reputation for a smelly chemistry. So be sure that the printer you have on your short list has an ink that passes the sniff-test.

166. Is there any ozone suppression system inside the printer?

No, the only way to get rid of ozone is to suck out the air.

167. Is the machine enclosed, or exposed?

Enclosed

168. Does the hood close down completely to seal the system, or are there a few inches open at the bottom?

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

Most large dedicated flatbed printers have no hood at all (Oce Arizona 250 is the worst offender). Some gantry structures are enclosed (Teckwin TeckStorm, for example).



The hood has rubber-like flaps on the edge to let rigid media through. This flaps also protect from the UV-light.

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

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

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

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

171. Does the ink used in this printer contain chemicals suspected of causing cancer? Does the ink in this printer contain chemicals that may cause problems with genes?

And the other question, for using UV ink in the EU, is whether any chemicals in the UV ink in the printer that you have selected is prohibited for certain uses (such as for wallpaper). These are questions you need to ask a chemist since most people in the trade show booth may not know the answers. And merely reading the MSDS (which is usually a challenge to obtain in any event) is not much help unless the pros and cons of each chemical are clearly expressed.

172. Does your ink contain any chemicals in Risk Class R40 or R43?

Yes, the operator has to wear glasses when handling UV curing inks as well as cleaning agents or working on ink-carrying elements, when opening protective devices on the print head, he must wear suitable eye protection (closed eyeglass frame).

The tables of Oce, Mimaki, and some other flatbeds are bright polished metal (aluminum?). So you have an almost mirror-like surface directly below your UV lamps.

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

The tables of Oce, Mimaki, and some other flatbeds are bright polished metal (aluminum?). So you have an almost mirror-like surface directly below your UV lamps.

PRINthead TECHNOLOGY

174. Which brand printhead is used?

Spectra. You can have 30pl for colors and 80pl for white ink.

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.

175. Which model of printhead is used

Spectra SE Class and SL Class. You select which you prefer.

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

Not at all. Spectra is one of the most respected companies in the print market and their printheads are used by the best wide-format UV printers. However, many companies don't make printhead information available in their literature.

177. How many nozzles per printhead?

128 inline nozzles that can be treated individually.

178. How many printheads per color?

36 head version gets 6 printheads per color.
48 head version employs 6 printheads per color and 12 for white ink.

179. How many total number of printheads?

36 head version for 6 colors.
48 head version for 6 colors + white ink.



Printhead carriage.

180. 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.

PRINthead DPI & Features

181. What is the drop size in picoliters?

Depending on the customer's specification, the printheads can have a droplet size of 30pl (Spectra SE Class), 80pl (Spectra SL Class), or a combination of both variations.

182. Is there variable droplet capability?

The size range is explained in the following table

	Calibrated drop size	Adjustment range for drop size
Spectra SE Class	30pl	25-30pl
Spectra SL Class	80pl	65-90pl

183. What is the nozzle spacing?

508 microns

184. 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?

	Advertised DPI
Spectra SE Class	900dpi
Spectra SL Class	450dpi

The printhead literature does not mention if the dpi are true or apparent.

185. 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?

Native resolution is 100 dpi. To achieve 700 dpi must do 7 times.

186. How many passes can this printer achieve?

This printer can achieve up to 84 passes.

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).

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

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.

188. Is nozzle compensation available?

No, you must purge.

Bi-DIRECTIONAL VS Uni-DIRECTIONAL PRINTING

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

The direction of uni-directional printing is left to right.

190. Is printing bi-directional or uni-directional?

Depends a bit on color management; too much ink gives gloss banding.

191. 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**192. What is the position of the printheads relative to the media? Above, jetting down (the common position) or along-side, jetting horizontally (rare)?**

Above, jetting down.

193. 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.

194. Do you raise the heads manually, with click stops, or motorized?

It has digital display but with manual mode.

195. How complex is the procedure to align the printheads? When you add a new head, how long does it take to align it?

The HP spec sheet is helpful in alerting you to the reality of aligning their X2 MEMS printhead when you need to replace a failed head with a new one: 45 minutes. Even if this honest estimate was not provided in the spec sheet, it would be ascertainable sooner or later anyway. I commend HP for being ethical in listing this aspect of maintenance.

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

Yes you can vary the printhead carriage height manually. If the gap is too large, the image quality will be negatively affected. If the distance is too small, there is the risk of printhead strike, which can totally damage the printheads.

You can set the appropriated height with the crank handle that is located on the back right of the printhead carriage. A full clockwise rotation increases the distance by one millimeter.

The height value is displayed electronically on the printhead carriage. As you can see in the display screen, the distance can be varied by increments of 0.1 mm.

197. How is the nozzle plate protected? Is it recessed?

It is protected with metal plate.

PRINthead: Associated Features**198. Is ink heated in a buffer or elsewhere before arriving near the printhead?**

Yes, it is heated.

199. Or is the entire plate heated and thereby some heat gets to the heads?

Yes, the plate is heated.

Heating the metal plate that holds the nozzle-plate area of the printheads as a group (the base of the printhead carriage so to speak) is a cheap way that early Chinese printers did their heating. Today GRAPO is perhaps the only serious UV-curable inkjet printer manufacturer outside China that uses a heated plate to heat their ink (but with 45 manufacturers, there are always surprises). GRAPO has plenty of experience since they are themselves a signage printshop, so they would not use any system that was not successful.

200. What is the firing frequency (voltage) of the printheads (in KHz)?

The firing frequency of the printheads is 20 KHz maximum.

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

Yes, The operator can modify the KHz of printheads from 2 to 20.

202. Is negative pressure required to maintain the ink (without the ink dripping out the printhead when the machine is turned off)?

Yes it is required. One of the components in the ink system is the meniscus regulation system. This mechanism prevents the ink from flowing out of the printheads

203. Is the negative pressure user variable?

Yes.

204. Are there problems of air getting into the system?

As with many other printer designs, air bubbles can occasionally get into the ink path.

205. How is air eliminated from the ink lines or from the printheads?

There are degassing pumps to get out micro bubbles. A secondary circuit is what WP calls the lung. It removes any air bubbles remaining in the ink and ensures a continuous flow of ink.

PRINthead Life Expectancy**206. What is true life expectancy of this print head?**

Life expectancy is from 6 to 12 months. (Usually much more than 12 months if heads are maintained as suggested).

207. How can head strikes be avoided?

One of the requirements of rigid boards is to have a constant height. The printhead carriage height can be set manually at the appropriate distance.

For roll-fed media, the manual recommends to verify that media is not frayed or undulated in order to avoid head strikes.

208. Is the printhead user installable?

Yes, it is completely installable.

PRINthead CARRIAGE and GANTRY**209. Describe the design and construction of the carriage area?**

Rak Kumar has many years of managing wide-format printer companies, so he knows all the design aspects of a printer. If you wish to learn some of the jargon and design features of a UV-curable printer yourself, it is worth visiting the booth where he exhibits (generally the booth of EFI).

210. Describe the overall "bridge" the rail structure along which the printhead carriage travels, especially for dedicated flatbed printers that have no hood?

The bridge is supported on both sides of the machine stand with linear guides. When plate material is printed, it moves over the substrate along the y-axis driven by a linear motor. In roll-to-roll printing, it remains stationary on the front side while the substrate is transported.

A linear measuring system measures the actual position on both sides.

211. What moves the carriage?

The head carriage is driven by a linear motor.

MOTORS: Stepper, Linear, Magnetic ?

212. Describe the motor and the system that moves the printhead carriage? Is the motor for the carriage a linear servo motor or a stepper motor?

The head carriage is driven by a linear servo motor ("magnetic linear drive").

The only major UV printer that still uses an antiquated stepper motor is the Mimaki JF-flatbeds. A stepper motor moves the carriage (or other part of the printer), in steps of set distance. Downside is that they are not as accurate since they don't provide feedback that can be monitored and allow correction on the fly. The crucial advantage of a servo motor (usually an AC servo motor) is that it provides feedback and can correct its positioning. But since a servo motor is significantly more expensive, it is missing from many UV-curable printers.

SUBSTRATES

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

It is not only possible to continuously print from roll to roll (textiles, paper, vinyl), but also to print sheet substrates measuring up to 95 mm in thickness.

214. What sizes of material can be printed on?

Model	Media width	Media length	Media weight
WP Digital Virtu RS25	2500 mm	1200 mm	50 kg/m ²
WP Digital Virtu RS35	3500 mm		

Notice that this information is for flatbed media. For roll-fed, the printable media width is the same, whereas the length is any.

215. 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.

Model	Media width	Claimed by how the model is named
WP Digital Virtu RS25	2500 mm	RS25
WP Digital Virtu RS35	3500 mm	RS35

216. Can you adjust the rate of media feed?

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

LOADING MEDIA

217. If roll-to-roll, what core diameter(s) will this printer accept?

The diameter is from 3" or 6".

218. How about maximum roll diameter or weight?

The maximum weight is 500Kg. and 45cm. of diameter.

219. What thickness can this printer handle?

This machine can handle materials up to 95mm thick.

220. 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”).



You need to be aware of the need to have the right height to avoid head strikes. On the other hand, if your printheads are too high, you could get print quality issues.

221. Is roll-fed media loaded from the rear, top, or front?

Roll-fed media is loaded from the front.

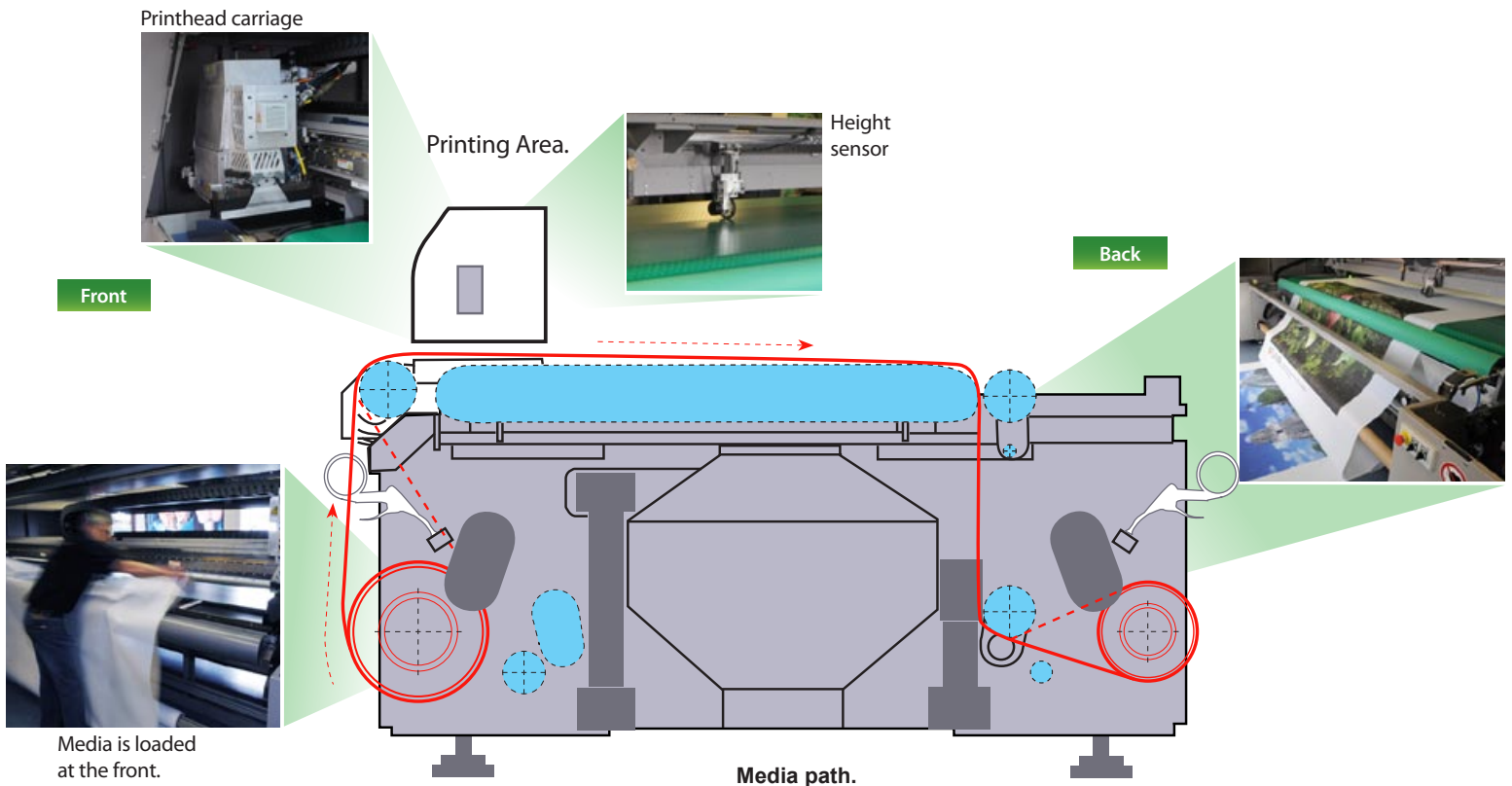
222. If you have to load a really long roll, are there clamps or any other system to allow you to secure the first portion so the first portion won't undo itself while you are several meters away trying to load the other end?

The Durst Rho 351R has clamps so if only one person is available to load a long roll, he can clamp down the first portions that he feeds up and over into the platen area while he is still working on the other end of the roll to get that up and into the roll-feeding system.

223. What is the media path?

Media path will depend on whether the media needs to pass through the furnace or not.

In general, the substrate is pulled off the front spindle (the unwinding spindle) via the front compensator system to the transport belt and from there, depending on the type of substrate used, through the furnace or directly via the rear compensator system to the rear spindle (winding spindle).



SUBSTRATES, Materials, Applications, and Issues

224. What materials does the manufacturer list?

Boards, dibond, wood, Plexiglas, metal (but be aware that if the surface is too reflexive, it could damage the printheads), textiles, foils and other substrates.

225. What materials can this printer print on perfectly?

The best is Dibond, drops stay very accurate.

226. 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.

227. What materials can this printer print on sort of okay, but where you have to overcome problems?

Thin materials may be delicate in the sense that some of them have low tear resistance and can be damaged if the vacuum is set too strong.

Rigid media with uneven surfaces may be difficult to print since height consistency is crucial to obtain optimal print quality. If the bottom (the surface in contact with the transport belt) is uneven, there is a risk that the material is not conveyed smoothly due to the additional air on the vacuum table.

Thermally sensitive materials and heavy boards need special attention too. Materials with frayed or elevated edges will require a higher printhead carriage height which will tend to decrease the image quality. Too porous materials are difficult to print because the vacuum does not take effect and you can't have an accurate positioning. Elastic media buckles during conveying, and this distorts the images.

228. What materials can this printer not print on at all?

Dibond mirror is okay, but not real mirror.

229. Can you print on mirrors?

No. If you print on highly reflective materials you run the risk of destroying the printheads because of the UV radiation.

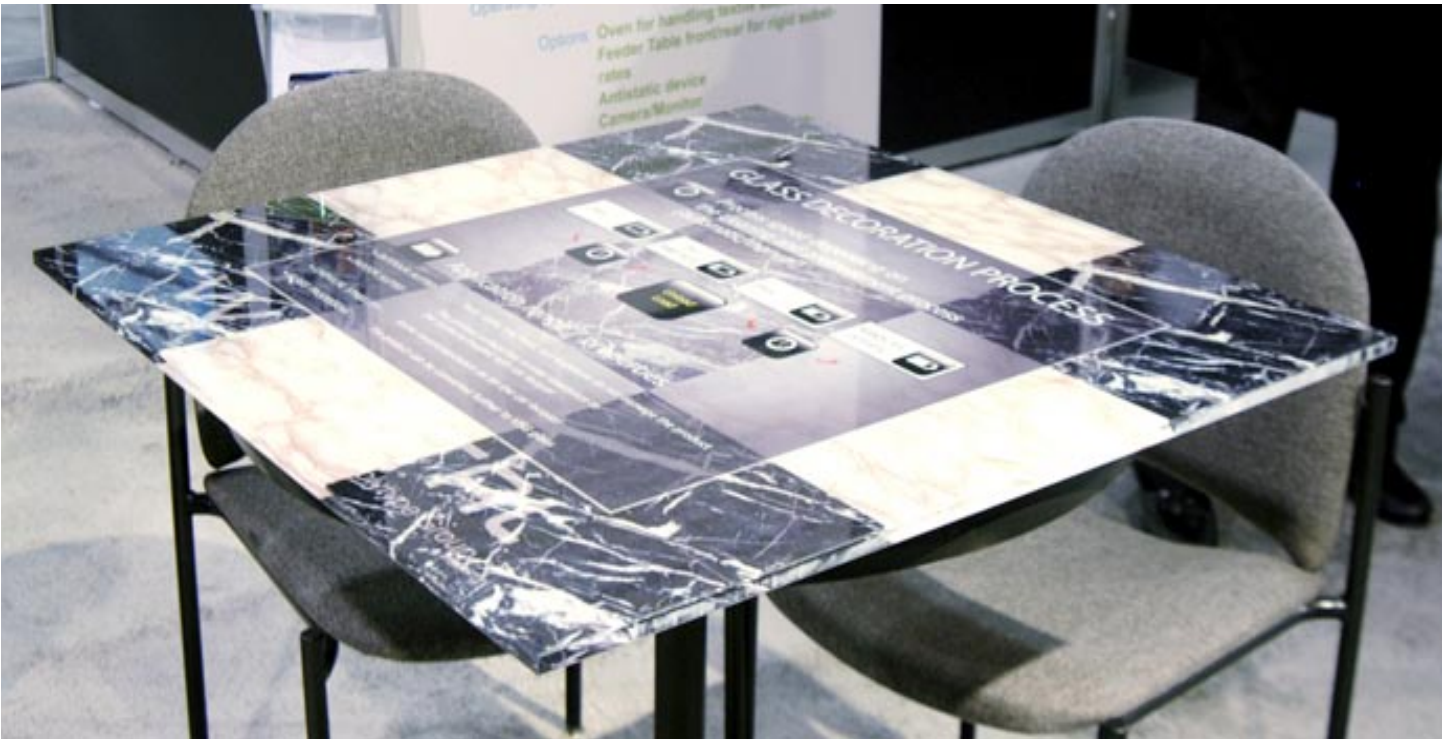


Table top printed on with the WP Digital Virtu RS35/48. ISA 09.



Fine-art applications printed on Dibond boards.





Nicholas Hellmuth and Diana Dugaru examining a roll-fed print sample. The photo used was taken in Tikal, Guatemala by Dr. Hellmuth.



Photographs of FLAAR photo archive. These kind of themes can be printed only on a high-quality machine as the RS printers.

230. 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?

Hard PVC is tough to print, it is heat sensitive and static but now WP Digital offers two anti-static bars.

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).

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.



Exhaust tubes are not only to suck the odor and ink mist, but to remove some of the heat too.

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

You do need to be aware of how to prevent static electricity build up:

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

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

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

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.

SUBSTRATES: Cleaning, Priming, Preparation

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

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.

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

You need to pre-treat glass and ceramics. Alu Bond can also be prepared with same steps as glass: clean, heat, spray.

234. 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.

Glass must be treated with corona treatment, but corona treatment has a very short shelflife.

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).



Customers experiences the glass cleaning and pre-treatment guided by Diana Dogaru Glass decoration Process Product Manager.

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

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

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

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



Cleaning and pre-treatment kit for glass decoration.

WHAT IS THE INTENDED MARKET FOR THIS PRINTER?

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

The manufacturer lists some of the main applications this printer is meant to print:

- Outdoor advertising
- Indoor advertising
- Interior design (kitchen, bathroom, bedroom decoration)
- Walls and flooring
- Fair booths

APPLICATIONS

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

Yes, there is a trough to print reticulate substrates like mesh or textiles. The advantage of this system is that the trough can be removed; if the table attachment is not required, you can swivel it downward with a crank you find at the left.

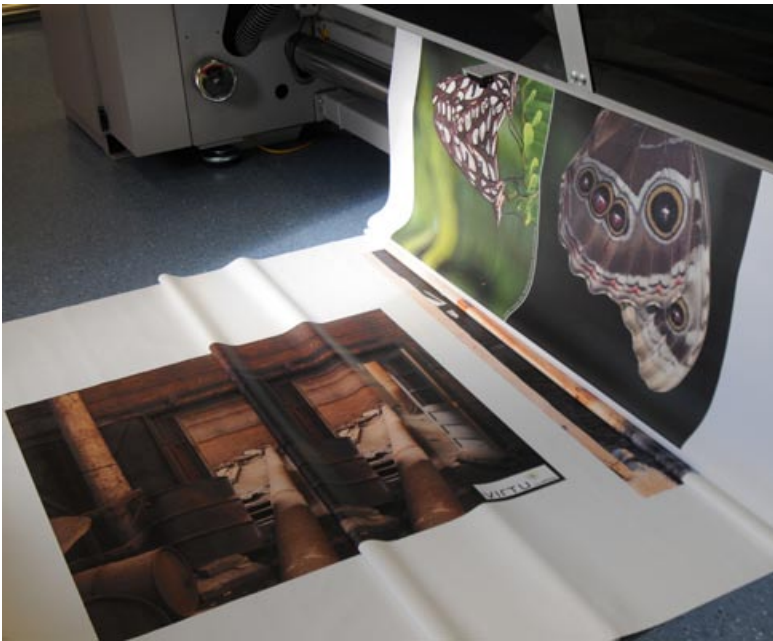
WP Digital offers an optional furnace to complete the drying process on textiles.

There are two issues with printing on fabrics: first, the ink goes through the weave and ends up on the table or transport belt or platen. Second, the fibers from fabrics or mats can get onto the printhead nozzle plate and sometimes up into the nozzles.

238. What other kinds of applications can you print?

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

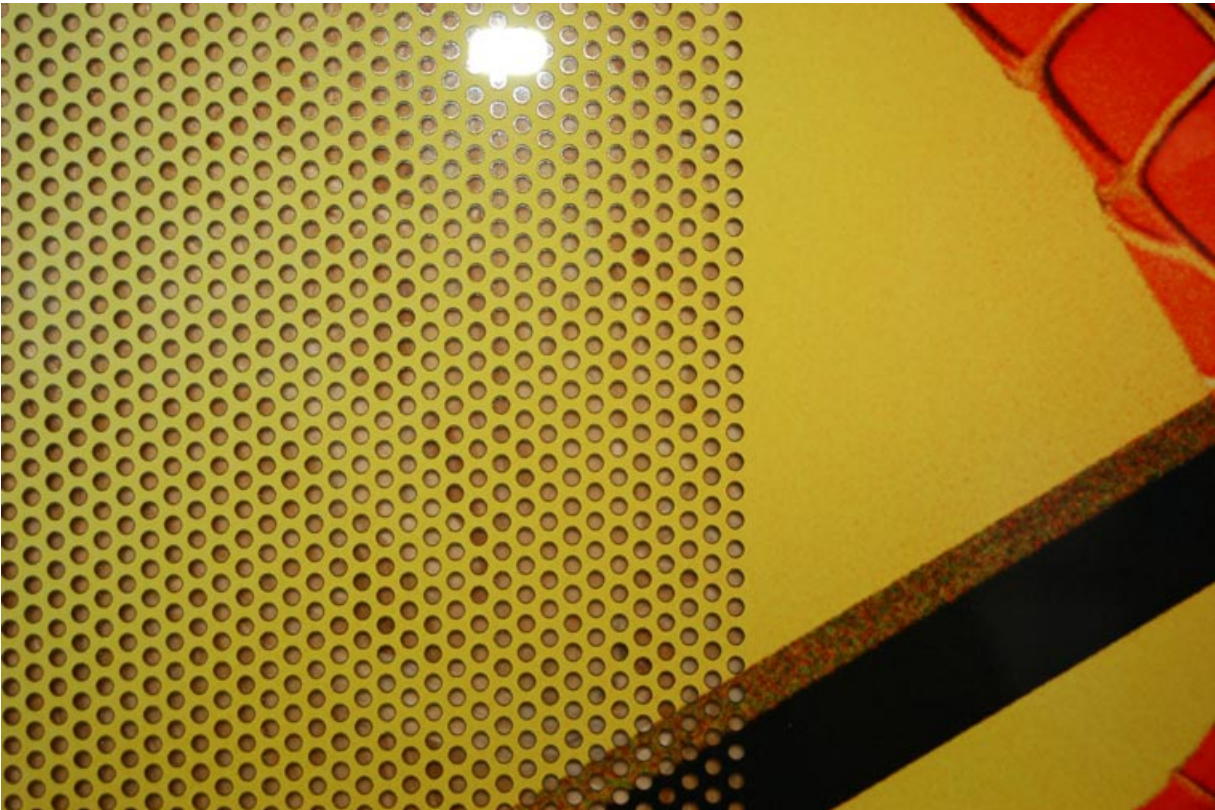
That said, today (2008) the inks are a lot better and you can consider experimenting with UV-curable vehicle wrap especially since 3M inks are specifically directed towards allowing vehicle wrap. Actually I have seen vehicles being wrapped with prints from GRAPO Octopus, using their normal UV ink.



Samples of other materials with other images. I feel that printing on diverse architectural materials and materials for interior decoration is a bright future for print shops. You can earn a lot more profit if you print on unusual materials.



This model was printed on the The WP Digital Virtu RS35/48 and then cut with a Zund cutter. The range of applications is very wide.



Mesh on glass.



Mesh on glass exhibited at ISA '09 in WP Digital booth. You can see the transparency in this application.



Glass samples at the Euro-Reklama Poznan '09. Laying on the floor, the FLAAR evaluations banner printed on with the WP Digital Virtu RS35/48.

INK

239. 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.

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

The printer enables the use of up to 8 colors. In addition to CMYK, you can presently use Light Cyan and Light Magenta and/or white as well.

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

12 months for colors.

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.

242. Does the white ink have a shorter shelf life?

6 months for white ink

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

The inks are made by Sun.

244. Does the printer manufacturer have its own ink chemists on staff?

Grapo, being a printshop, uses UV-cured ink on a regular basis. So their printshop for billboards, banners, POP, thermo-formable and other applications gives them daily experience. In some aspects this counts more than having an ink testing laboratory per se (which they do not have).

Durst, HP and comparable large printer manufacturers have their own ink chemists (even when they don't necessarily manufacture their own ink). But even when a company owns their own ink factory, sometimes they also rebrand the ink from completely different ink companies when they need an ink that they themselves do not yet make.

INK: White & Varnish

245. Is white ink available?

Yes, if you purchase this option.

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

The ink configuration allows you to have light colors plus white. There is no need to decline any color in order to have white ink lines.

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

White ink is printed simultaneously with the other colors.

248. 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.

249. 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.

250. Is spot varnish available?

No. Varnish is hard to handle on any printer.

INK Cost**251. Does the refill container of ink come in cartridge, bottles or bulk? How large are the ink containers for this replacement ink?**

The refill container can hold 5 liters.

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.

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

The main tank can hold 6 liters.

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

Cost of ink varies depending on the dealer/distributor, and depends on what country you are in. Usually the smaller and cheaper the printer, the more the ink costs. The larger the printer is, and the more ink it uses, the lower the ink is priced.

254. 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, it is accurate via RIP software.

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

It is collected in a tray.

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

You have to empty the container about once a week.

257. How do you know when the waste container is full?

You just have to look at it.

258. How can you see the remaining ink level? Do you have to ask to see the ink mode, or is the ink status available at all times?

The ink containers have a level sensor that is located at the lower third of each tank. This monitoring device is never in contact with the content of the container. According to the readings of this sensor, a message of refill ink will be displayed via software

259. Can you hot swap the ink (refill with ink while the printer is running)?

One of the modifications made to the original printer is the incorporation of ink tanks, which allows you to fill while printing.

INK: Supply System, Tubing, Filters, etc**260. Where are the printer's ink containers located? Front, back, or end? Up on top or lower down?**

They are located at the right end cabinet. The ink containers are accommodated in a sort of drawer that can be pulled out. The containers are adequately arranged and identified.

261. How do you avoid building up old ink inside a large container?

WP offers optional stirring devices that are necessary if you use inks that have a strong sedimentation tendency and/or whose homogeneity can be improved by repeated mixing. The stirring device is located under the respective tank.

262. 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.



Ink containers located at right end cabinet.

263. 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.

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

Ink lines are black, as in most cases where Spectra heads are used.

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).

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

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

266. 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.

267. 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.

INK Color Gamut**268. 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.

269. 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.



Nicholas with Diana Dogaru from Virtu team for both Virtu in the company demo room facilities in Wittenbach, the day after FESPA Digital 2008 in Geneva.





Print samples exhibited at ISA '09. You can see the wide color gamut offered by the WP Digital Virtu RS35/48.



Print sample exhibited at ISA '09. Skin tones are excellent.



THE UV CURING LAMPS

270. How many different sets of lamps are there? Is there pinning first and then curing later?

The printer has two UV-curing lamps at each side of the carriage.

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.

271. 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 Oce 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.

272. How many watts are the lamps?

2 x 4.5kW

273. What about shut-down sequence, shut-down time, and wait-time before restrike?

The manual states you have to wait at least 3 minutes before printing when you have turned off the printer.

274. What brand of lamp is used?

Printing Research Inc. is the company that makes the UV lamps.

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.

275. How many lamps does the printer use?

Two lamps, one leading and one trailing lamp.

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).

276. Can you have one lamp on one setting and the other lamp on another setting? Or do both lamps have to be on the identical setting?

Both lamps are going to be in the same setting.

277. 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.

278. How long does the lamp last, in terms of hours of operation?

Approximately 1000 hours, depending on the mode of operation.

279. 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.

280. 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

286. Are the UV lamp fixture set at an angle or perfectly parallel to the printing plane?

The lamps are parallel to the printing plane.

287. How long does the print emit a potentially objectionable odor?

You should wait at least 30 seconds before opening the hoods to allow vapors created during the printing process to be removed.

288. 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.

289. 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

281. Are there shutters?

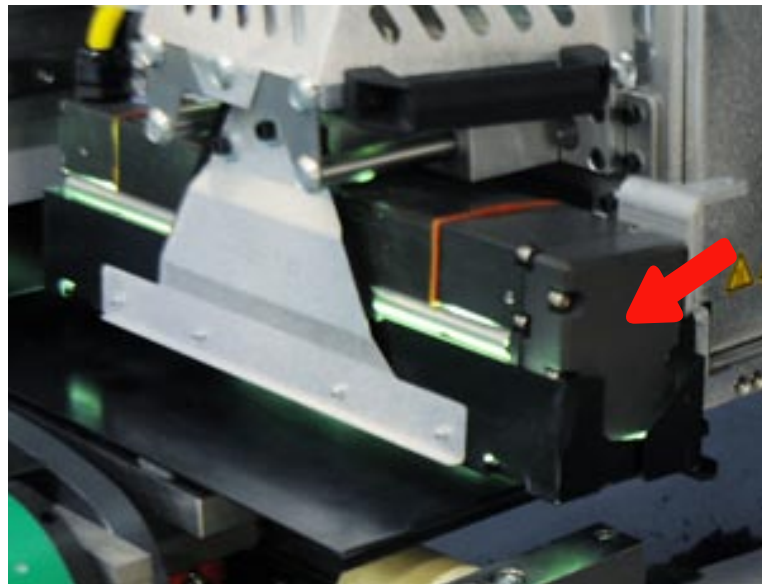
Yes, the lamps have shutters.

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.

282. 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.



The UV-curing lamp has shutters of an intelligent design that are both more effective, and, since they are cleverly situated, they are not as likely to cause problems.

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

The machine uses a water cooler device that is located in a separate housing. It is preferably positioned at the bottom of the machine. The heat generated by the UV lamps is dissipated in a closed cooling water circuit.

Also, one of the purposes of the air you need to provide to the printer is to feed the air cooling system for the lamps.

284. How many settings do the lamps have? Or are the fans just Off and On?

The modes or stages of the UV lamps are "off"; "warming"; "ready" and "cooling". Besides, the lamps can be adjusted to 5, 10, 15 and 20kHz.

285. 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.

RIP SOFTWARE & Printer Software

290. Which RIPs are featured?

Onyx or Caldera

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

The RIP is optional.

PRODUCTIVITY & ROI (Return on Investment)

292. 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.

293. How much time does it take to set-up each new size and shape of rigid printing substrate?

Compared to roll-fed media, loading new boards of rigid materials is relatively simple, although sheet-shaped substrates have to be loaded carefully, especially when using sheets with sharp edges and corners, as well as heavy sheets since these edges and tips may damage the transport belt.

What you really need to pay attention to is the workflow for printing roll-fed media. The manual recommends to schedule the print orders to avoid having to change rolls back and forth.

294. What is the level of productivity, high, medium, low?

This is an industrial printer. If you see the technical data sheet, you see that the print width is 2500 mm and 3500 mm, respectively. But the print length is endless. This means the printer offers a high level of productivity.

295. Can this printer hold up to two or three shifts per day all week?

Yes.

296. Does this printer have to be turned off to rest between shifts?

No.

COMPARISONS WITH OTHER PRINTERS

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

Other UV-cured printers of similar characteristics are the Durst Rho 800, Océ Arizona 350GT and 350XT, The VUTEk QS2000. People might also consider dedicated printers like the Gandinnovations Jeti 1224 for rigid applications, the HP Scitex XP5300, Gandinnovations Jeti Galaxy and JetSpeed, the Matan Barak5 for roll-to-roll applications. But none offer the XY movement on a transport belt in the same machine as a roll to roll. This Virtu is completely unique.

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

The Océ Arizona printers have a reputation of being slow, require primer to handle Coroplast, and the Sericol ink does not adhere to Sintra (when you cut the edges). UV printers from HP have been successful in the market but several models such as the 3.x mter model former NUR Expedio and the HP Scitex FB6100 (NUR Tempo Q) have too many issues. The Gandinnovations printers handle either only rigid substrates or only roll-to-roll media, not both.



The HP Scitex FB6100 is comparable in size and applications, but it has too many issues to be considered a successful printer.

CONCLUSIONS:

299. 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.

300. 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.

We have completed many inspections at trade shows; have two demo room and factory visits, and as soon as we can do a site-visit case study this evaluation will be updated with the results.



The FLAAR evaluations on this WP Digital Virtu RS35/48 were handed out to attendees at the Euro-Reklama Poznan 2009



WP Digital and SignTech staff receiving the gold medal at the Euro-Reklama Poznan 2009 show.

Pros

One main benefit of this printer is that it is manufactured in Switzerland. I have visited the former L&P factory in the US. The primary engineer said point blank, "the engineers and factory in Switzerland consistently produce a better printer than anything that even with unlimited money we could produce in the USA."

Reportedly US customers who have L&P versions of earlier models say the same thing when they visit the new Swiss factory, "wow, this version of the Virtu has features and a precision I did not find on my L&P printer."

Realize that the L&P factory in Florida has been closed (also realize that this factory produced the best, most rigid, and most sophisticated grand format printer made in the entire North American continent: USA and Canada together. This is a polite way of saying that the old L&P were better in most respects to over 60% of the printer brands and models made in Canada, US, Asia, and some European brands. But the Swiss version is simply better.

I lived in Zurich for three years and can testify to the Swiss style. My brother studied architecture at the leading university in Switzerland (ETH). So we are both familiar with Swiss philosophy.

WP Digital is savvy about applications, such as printing on glass. Most other printers are made for banners and billboards. The Virtu can print on vinyl and banner material, but the WP Digital personnel are skilled in assisting you to handle material such as glass. Just make an appointment to visit the demo room in Switzerland (an hour or so from the Zurich airport). This trip is worth the time.

Cons

It is a challenge to find something wrong with a printer designed from the ground up to be precise and to be innovative (XY printing in flatbed mode). But just as soon as I find something that should be improved, I will update this report with specific comments.

WP Digital (WIFAG Polytype) has changed its name and management. The new company name is Polytype, but the WP Digital web site continues as before. The name of the printer models remains "Virtu."

If this printer is available used, should you consider it?

75% of the printer models available that are over two years old I would not instantly recommend them if used. But this Swiss-made printer, yes, if well maintained, a used version should be good.

Final Comments

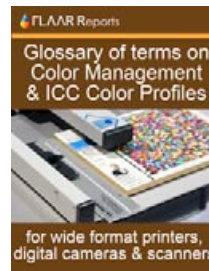
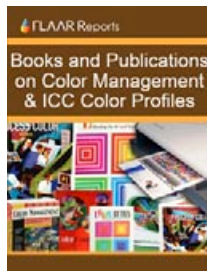
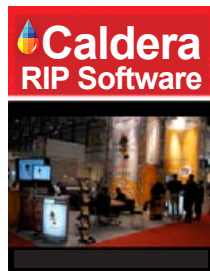
The evaluation of a printer of this sophistication is rather simple: it allows you to accomplish dedicated flatbed printing in XY mode; allows you to do flatbed printing on a moving transport belt, allows you to do textiles with a mesh kit (trough); and can handle roll-to-roll. Kind of tough to find another printer that can do "everything."

Plus it is made in Switzerland (nothing is perfect, but the engineers definitely have perfection in mind).

In addition, WP Digital is dedicated to assisting end-users to handle profitable applications. Yes, there are several UV printer brands that are sophisticated in some aspects of this, but our conclusion is that the Virtu RS25 and RS35 definitely warrant being placed on your short list.

Most recently Updated October 2010.

Updated June 2009. Updated April 2009, after ISA '09. First issued March 2009.



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

RIP, COLOR MANAGEMENT, and ICC Color Profiles options

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

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

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

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

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

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

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

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



Caldera also offers a highly regarded spectrophotometer from Barbieri, the leading color management company in Italy (they are headquartered in the same city as Durst, the manufacturer of Rho UV-cured printers).

For further information on Caldera contact Joseph MERGUI mergui@caldera.fr
If you have questions about color management, if you are in the US you can contact: ImageTech at: www.ImageTechDigital.com
 Mark Spandorf (owner and president), mark@imagetechdigital.com or 510 238-8905.
 If you are in Europe or the rest of the world you can contact **BARBIERI** directly at: BARBIERI electronic snc, info@BARBIERIElectronic.com
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 Fax: +39 0472 833 845

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

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

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

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

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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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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. If you received a FLAAR PDF from a sales rep, they may give you an early version; perhaps there is a later version that mentions a defect that we learned about later.

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

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

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

It is also crucial to realize that an ink (that we inspect, that works well where we inspect it), your printer, your printhead, the heat, humidity and dust conditions in your printshop, may cause that ink to react differently in your printer. And, there are different batches of ink. Even in the really big multi-national billion-dollar ink companies, occasionally one batch will have issues. There are over 100 ink companies; six colors per company, many flavors of ink per company per color. We have no realistic manner of testing each ink. The same is true of media and substrates. One production run can have a glitch: chemical or physical, even in the best of companies. A major Swiss-owned media company, for example, had several months of media which were almost unusable. Yet other kinds of media from the same company are okay (though we stopped using that brand and stopped recommending them after all the issues we ourselves experienced).

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent, eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Plus, there is no way to know if all MSDS sheets are honest to begin with! Our reports are on usability, not on health hazards.

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

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

Results you see at trade shows may not be realistic

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

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

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 hard-

ware and software. This is why Nicholas Hellmuth is considered the “Johnny Appleseed” of wide format inkjet printers.

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

For example, you will most likely need a color management system which implies color measurement tools and software. To handle ICC color profiles, you may need ICC color profile generation software and a spectrophotometer since often the stock pre-packaged ICC color profiles which come with the ink, media, printers and/or RIPs may not work in your situation. Not all RIPs handle color management equally, or may work better for some printer-ink-media combinations than for others. Please be aware that our comments or evaluations on any after-market ink would need the end-user to use customized ICC profiles (and not merely generic profiles).

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

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

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

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

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

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

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

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

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

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

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

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

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

Yes, it is rather self-evident that we would never ask a manufacturer to send a product which we knew in advance from our studies was no

good. But there are a few other printers which are great but we simply do not have them in our facilities yet.

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

Realize that a FLAAR Report on a printer is not by itself a recommendation of that printer. In your local temperature, in your local humidity, with the dust that is in your local air, with your local operator, and with disorientation of the insides of a printer during rough shipment and installation, we have no knowledge of what conditions you will face in your own printshop. We tend to inspect a printer first in the manufacturing plant demo room: no disjointed parts from any shipment since this printer has not been lifed by cranes and run over a rough pot-holed highway or kept in 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 do have a fair record of response; Teckwin is one (based on a case of two problematical hybrid UV printers in Guatemala). The distributor said that Teckwin sent a second printer at their own expense and sent tech support personnel at their expense also. But unfortunately both the hybrid UV printers are still abandoned in the warehouse of the distributor; they were still there in January 2009. But Teckwin has the highest rating of any Chinese company for interest in quality control and realization that it is not good PR to abandon a client or reseller or distributor all together.

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

Lack of Tech Support Personnel is increasing

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

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 sce-

nario for this was the half-million dollar LUSCHER JetPrint: so being "Made in Switzerland" was not much help.

Counterfeit parts are a problem with many printers made in China

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

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

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

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

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

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

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

Be sure to check all FLAAR resources

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

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

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 Caldera, EskoArtwork, EFI Rastek, EFI and VUTEK, OTF (Obeikan), Drytac DigiFab, Barbieri electronic, Seiko II, Parrot DigiGraphic, AT Inks, Sepiax inks, Sam-Ink, Dilli, Grapo, 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 2010), 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, EFI, EskoArtwork, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Obeikan, Dilli, Drytac, 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. AT Inks, Bordeaux, InkWin, Sepiax, Sam-Ink, and Sunflower ink have brought us to inspect their ink manufacturing facilities and demo rooms. Notice that we interact with a wide range of companies: it is more helpful to our readers when we interact with many different companies rather than just one.

We have visited the world headquarters and demo rooms of HP in Barcelona and received informative and helpful technology briefings

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

Contributions, grant, sponsorships, and project funds from these companies are also used to improve the design and appearance of the web sites of the FLAAR Information Network. We thank Canon, ColorSpan, HP, ITNH, and Mimaki for providing wide format printers, inks, and media to the universities where FLAAR does research on wide format digital imaging. We thank Epson America for providing an Epson 7500 printer many years ago, and Parrot Digigraphic for providing access to their digital equipment, also 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 improvement in the next generation, we let people know. If a product is hyped by what an informed user would recognize as potentially false and misleading nonsense, then we point out the pathetic discrepancies very clearly.

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

Actually, most of our reviews are based on comments by end users. We use their tips to check out pros and cons of virtually every product we discuss. You can't fool a print shop owner whose printer simply fails to function as advertised. And equally, a sign shop owner who earns a million dollars a year from a single printer brand makes an impact on us as well. We have multiple owners of ColorSpan printers tell us that this printer is their real money earner for example. We know other print shops where their 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, media, substrate, a software, laminator, cutter or whatever part of the digital printing workflow is intended to provide feedback to all sides. The manufacturers appreciate learning from FLAAR what features of their printers need improvement. In probably half the manufacturers FLAAR has dealt with, people inside the company did not, themselves, want to tell their boss that their pet printer was a dog. So printer, software, and component manufacturers have learned that investing in a FLAAR evaluation of their product provides them with useful return on investment. Of course if a printer manufacturer wants only a slick Success Story, or what we call a "suck up review" that simply panders to the manufacturer, obviously FLAAR is not a good place to dare to ask for such a review. In several instances it was FLAAR Reports that allowed a company to either improve their printer, or drop it and start from scratch and design a new and better one.

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

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

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

Contributions, grants, sponsorships, and funding for surveys, studies and research is, however, open to a company who has an accepted standing in the industry. It is helpful if the company has a visible pres-

ence 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, inks, cutters, laminators, and color management systems.

These are some of the most
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Inkjet Printer Trends Reports:

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