

Dedicated Flatbed UV-Cured Printer



GRAPO Manta



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INTRODUCTION

One by one the printer manufacturing companies are realizing that to handle thick and flat material you really need a dedicated flatbed printer. The transport belts of combo machines are not always perfectly accurate. For example, you could probably not print lenticular lenses with a combo or hybrid system. A hybrid printer has a platen; a hybrid printer is basically a solvent inkjet with UV lamps and otherwise retrofitted to handle UV-curable ink.

Inca and Gandinnovations realized this to begin with and never made a combo or hybrid machine. NUR found out the hard way that it's tough to have an ideal roll-feeding system on a dedicated flatbed.

GRAPO makes a nice combo printer, the Octopus. But this is really intended primarily for roll-fed materials, as you can tell by their wide version, the Octopus BIG (which is a dedicated roll-to-roll, not with a moving transport belt). It is not labeled as a flatbed. Thus it is logical that GRAPO would make a dedicated flatbed.

VUTEk will have its DS dedicated flatbed that hopefully actually functions by next year and other manufacturers will follow (but the VUTEk is over one million dollars...). Although a hybrid can be immensely successful (800 sold by ColorSpan); and although a combo concept has been successful for Durst and GRAPO, one by one most manufacturers will add a dedicated flatbed. More and more will launch a dedicated roll-fed printer too.

Since UV printing on flat and rigid material tends to represent a higher percentage of profit for sign shops, it was a good idea for GRAPO to design and launch their Manta.

THE BASICS

1. Brand name, model?

GRAPO Manta.

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

There is only one size of this printer, a healthy industrial-strength size of 2x3 meters.

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

GRAPO Technologies designs and manufactures this printer in the Czech Republic. We have visited the factory (twice, one in 2006 and again in 2008) and can document that this is not a Chinese printer whatsoever. This is European-made and European-designed. GRAPO is itself a sign printing company and their printers are designed for their own sign printing.

During most of 2006 the GRAPO printers were rebranded and sold by bedigital, a Spanish company. Distribution is being significantly expanded via other companies for autumn 2008 onward. All GRAPO printers will be available in the US, Canada, and Latin America as soon as distribution relationships are finalized and signed.

4. What other printers are the same or similar chassis from this manufacturer or distributor?

This printer is the first dedicated flatbed that GRAPO has manufactured. There are plenty of flatbed printers elsewhere to serve as inspiration. Fortunately GRAPO used more modern components than the Mimaki JF-1631. As a result of the robustness and provision of the engineers in the Czech Republic, even though GRAPO previously did not exhibit or sell in North or South America, they have sold proportionally more of their printers than Mimaki.

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

Yes, bedigital in Spain gives the printer a bedigital brand name, PUV2x3R. But it is the identical printer and there is no intent to obscure the origin of the printer. Bedigital simply prefers to put its own name on the printers that they distribute.

6. What other printers of other brands are comparable?

The competing flatbed printers would be the Oce Arizona 250 GT, the Mimaki JF-1631, and well-established printers such as the Gandinnovations Jeti flatbed. The Oce Arizona T220uv failed in the marketplace (overdesigned, "A Mack Truck with the engine of a Yugo," too slow, Xaar 500 heads).

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

The previous GRAPO printer was a combo but was primarily for roll-to-roll. The Manta is 100% flatbed.

8. When and where was this model first introduced?

First shown at Reklam Poligraf 2005; then FESPA 2005 in Munich. But it was not noticeable until 2006 at IPEX and FESPA Digital 2006. The 8-head Konica version was shown at the Madrid show, autumn 2006.



Grafo Manta at FESPA Digital 06.

9. List price?

130,000 to 140,000 Euros depending on factors such as country, features, etc. So check locally to see what the 2008 price is in your part of the world.

10. Does a complete set of full-sized ink cartridges come with the new printer, or merely a "starter set" that is not as full as a regular set?

GRAPO printers come with 3 liters of each color of ink.

11. 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?

An air system is included with the printer.

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

Not a must but it is recommended to have at least one extra printhead in stock. GRAPO prefers customer operators to know basic repairs.

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.

13. 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.

14. How does the total cost compare with other UV printers?

You can fill out the other columns for the other brands of printer that are on your short list. We can't fill this out for you, since we don't know what is on your short list.

FEATURES OF THE PRINTER: Vacuum

15. Is there a vacuum function?

Yes. Materials are held flat by the vacuum table.

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

The vacuum is created by an air pump.

17. If pumps, how many pumps are there?

There is a vacuum in 8 sections. The entire lower part of the machine consists of eight giant vacuum pumps (on the floor).



Below the flatbed table you can see the eight vacuum pumps.

STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path**18. Is this a dedicated flatbed with no roll-to-roll capability? Or is this a true flatbed or just add-on feeder platforms at front and back?**

This is a true flatbed with no roll-to-roll intent. Although it has been reported that you can print on flexible material such as vinyl, if the media is cut to size.

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 hybrid 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 VUTEk or other brand.

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

Yes, independent in software. Each section is either ON, or OFF (no intermediate levels).



The Grapo Manta is a dedicated flatbed printer.

FLATBED ASPECTS (for dedicated flatbeds)**20. If a dedicated flatbed, how many sections is the flatbed divided into?**

The table is divided in two sections.

21. If a dedicated flatbed, do the edges (joins) of the sections of the table cause a noticeable imprint on thin material?

It depends on how "impressionable" the thin material would be.

22. Is there a pinch roller system, and if so, where is this located?

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

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

Just realize that not all sheets of rigid material are themselves actually perfectly rectangular!

24. Does the printhead carriage move across the widest dimension of the table (like Gandy Jeti or Oce 250), or across the narrow dimension (this is how Inca does it)?

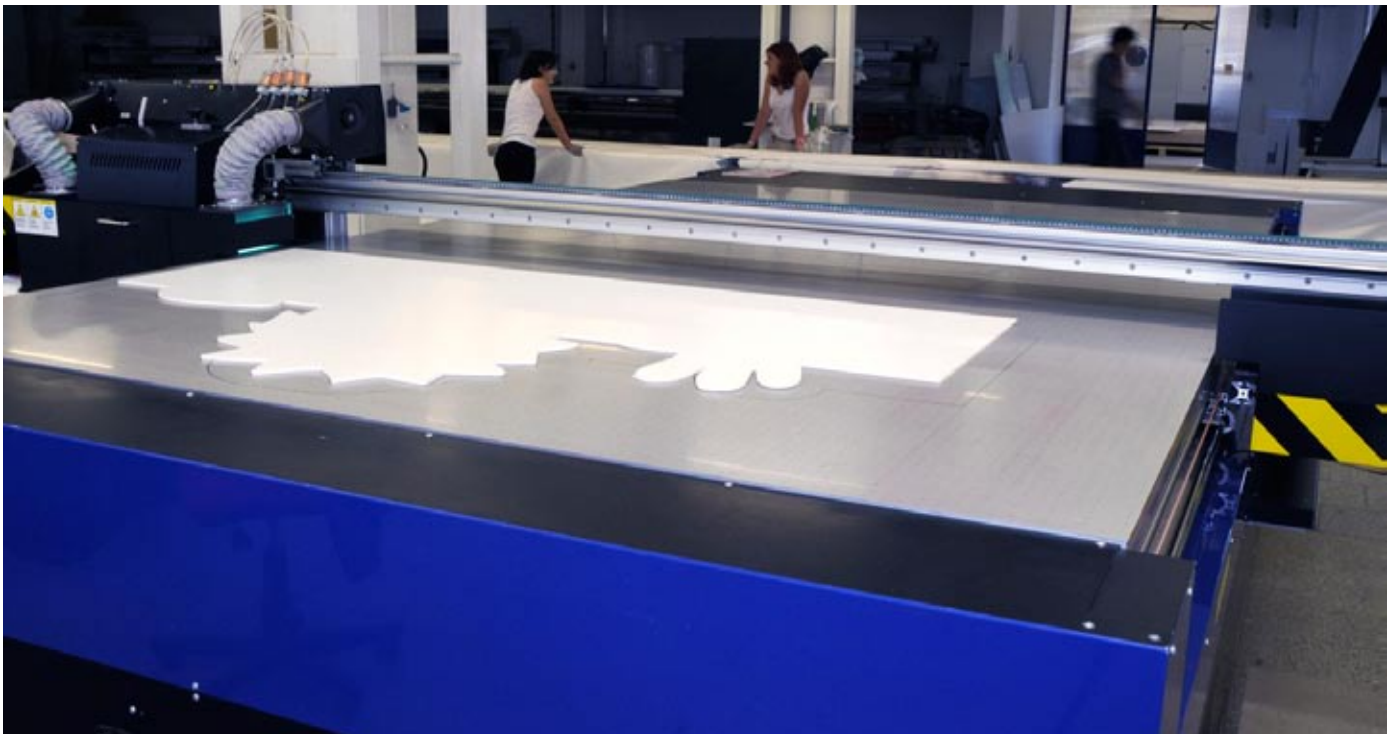
The carriage moves across the narrow dimension.

25. 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. But if you have a top-of-the-line combo printer, such as the Durst Rho 800, you can load at the back while the printer is cranking the previous job of flat material out the front: this can print and load and unload all at the same time. I have seen this ability to feed-while-printing also with the ColorSpan 9840uv (HP Scitex FB910).

But with a dedicated flatbed printer, there is no alignment issue just because the media is not cut squarely from the factory. Poorly cut material is a major disadvantage for combo or hybrid printers. So again, the reason there are more than four different classifications of UV printers (hybrid, combo, dedicated flatbed, dedicated R-t-R) is because each has pros and cons.

In theory, the perfect printer would be a dedicated flatbed with a dedicated roll-fed system across the long axis (Gerber unfortunately is trying this across the short axis). But an add-on roll-fed system is only successful if it can print as fast as a separate hybrid or combo system.



The carriage moves across the narrow dimension.

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

No. Not many printers have built-in levels.

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.

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

The printer has a leveling support in each leg, near to the wheels, but not in the same bracket.

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.

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

The four wheels are located on the cross diagonal supports.

29. 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?

There is a linear encoder that controls the movement of the carriage (X direction). The encoder strip is not made of gold, it is steel. The actual encoder is inside a safety shield.



The Grapo Manta has four wheels and leveling supports.

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.

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

The gantry is moved by a servo motor (Y direction).

If I remember correctly, there are no stepper motors in the GRAPO flatbed today. You want to avoid stepper motors; 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.

ACCESSORY TABLES (front and back) for Combo or Hybrid Flatbed
31. What is the approximate size of the table?

The table is 2.05 x 3.05 meters. It is 40mm thick.

32. 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.

33. 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.

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

Circa 22 x 26 cm. is an approximate minimum size. Minimum size on some printers is based on what the vacuum can realistically hold down.



Because the printer has eight sections for vacuum, it is possible to print relatively small materials. Measuring materials is a manual task.

UPGRADES, Future Improvements?**35. What features have been added, or changed since the printer first appeared?**

There are several modifications. e.g.,

- Starters used to be inside near lamps. Now they have been moved away from heat.
- The lamps now work with shutters.
- A red safety cord has been placed along the flatbed table.
- The linear encoder is new.
- There is an electrical purge system for negative pressure

The printer features these RIP options:

- Caldera
- Onyx
- Wasatch
- Aurelon
- Shiraz

Also it is worth mentioning that the lamps have a curing delay feature (lamp stay in parking area for ½ second) that makes output look glossier, like solvent output.

Miscellaneous

36. What moves:

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

The flatbed table is stationary. The carriage and printheads are what moves, in the traditional manner.

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

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



The flatbed table is stationary. What moves is the bridge where the carriage moves.

37. *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?).*

The carriage can hover over general areas but not over something as small as a business card.

Yes, 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.

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

There is no light, since the current model is an exposed printer. But the possibility of a version with hoods is under discussion.

OPERATING THE PRINTER

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

Not normally, but this option is likely to be available in the future.

40. What is the level of ease of use? Can anyone use this printer or do they have to be trained and certified? What about daily and periodical routine maintenance?

When you purchase the Manta from GRAPO direct, or from an authorized distributor or dealer, a technician arrives with the printer and a 5 day training is included with the price of the printer.

41. What sensors does the printer have?

The printer has basic normal sensors that are absolutely necessary for operation. The current model now features:

- Safety sensors
- Temperature sensors
- Lamp temperature sensor
- Ink level sensors (in the main tank and in the sub-tank)
- Vacuum pressure sensors

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

There are profiles only for common materials, such as paper, vinyl, etc. Normally, the customer “trains” the printer.

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

It is software-based in the sense that you operate it with mouse and/or keyboard, but it is not a touch screen system.

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

You get a 17” monitor.

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

The monitor sits on a table that swivels for left and right movement. Viewing angle on the monitor can be adjusted.

46. Where does the computer keyboard sit?

On a table of ample size.



LCD screen. The operator stands at the left.

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

Yes, the keyboard can be moved, and it has plenty of space.

48. Where does the operator stand or sit?

Near the PC that controls the printer, in the “front right”. Remember that the majority of dedicated flatbeds are exposed printers (with no hoods) and this makes more difficult to distinguish the front from the back.

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

You can pull the red STOP button from almost anywhere, but otherwise the back area is not equipped with operational controls.

50. What controls are on either end?

The ink is at the back end.

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

A pedal wouldn't be needed because you can stop the printer at any side.

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

Depends on the size of print. You can print large flat objects unattended, but not overnight since there is no auto-loader.



Only the ink containers are at the back.

53. Is there a pole with beacon lights?

No.

Dilli was among the first where I noticed a vertical pole with beacon lights. But people who worked on DuPont printers at the Flora factory in China suggested that DuPont also had a pole with beacon lights. 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.

CONSTRUCTION (BUILD QUALITY)

54. When designed, what is the life-span that each part is tested for?

Varies by part. 3 to 5 years. All incoming parts are tested.

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.

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

Metal. Construction is solid.

56. Is there a hood?

No hood currently.

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 Color-Span; 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.

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

The workmanship of the visible parts is clean, precise, uncluttered, simple as a positive statement.

AESTHETICS

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

Industrial in the sense of being substantial. Industrial but not rinky-dink.

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

The front is where the monitor is situated.

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.



On dedicated flatbeds, it is not easy to distinguish the back from the front other than by the monitor.

SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS

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

25-30 days.

61. What are the electrical requirements of this printer? This means, will the building have to be rewired.

Electrical requirement is 3 x 380 V, 17A, 50Hz.

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

All UV printers need room ventilation, for everything from ozone to misting ink to general odor. Increasingly ozone production is surpressed; 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).

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

Temperature: 20 - 30°C
 Relative humidity 30-70%
 Non - dusty area

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.

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

High altitude has not yet been tested.

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.

65. 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.

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

Network.

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

Everything is provided by the printer system.

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

2,4m x 4,4m x 1,5m and weight without packing of 7000kg.



The printer comes already assembled. The only thing you have to install is the carriage.

69. How many boxes arrive?

Two boxes arrive:

- One big box with the printer.
- One long box with the carriage.

INSTALLATION OF THE PRINTER

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

Depends on the place it will be installed, but a fork lift will be needed for sure.

71. Does the printer have lifting hooks on the top, or elsewhere?

The printer has forklift holes.

72. 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 get use a forklift truck.

73. Is installation included in the purchase price?

Yes.

74. How many people come for the installation?

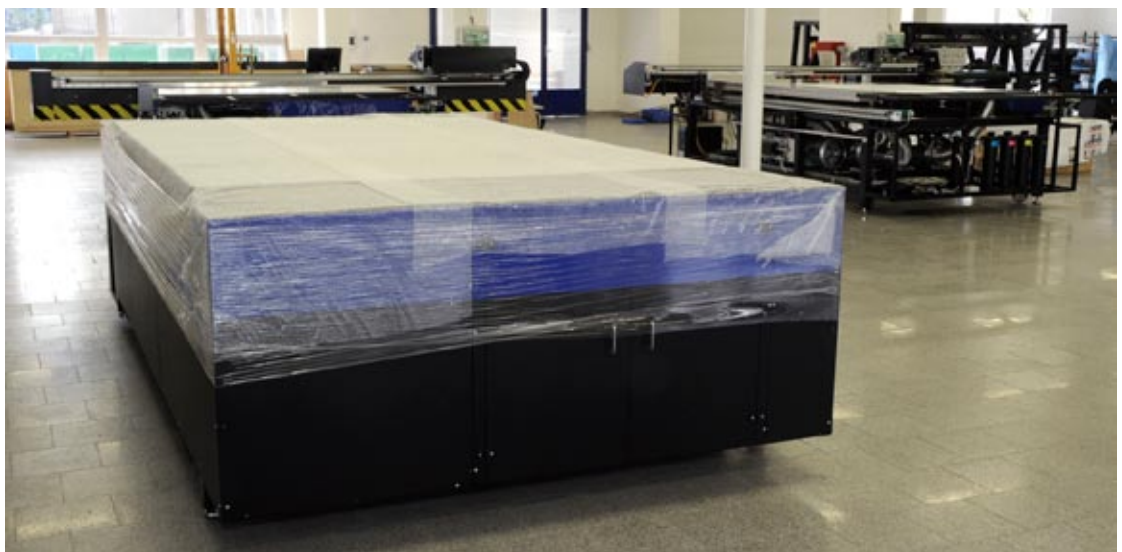
One.

75. How many people are required to lift, move... the printer during installation? How many people do you need to provide for the installation?

Just one person, other than the operator.

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

The distributor comes in person.



The installation is not difficult since it requires only one person.

INSTALLATION OF THE PRINTER: INSTRUCTIONS & MANUALS

77. How many manuals are available?

Service Manual and User manual.

78. What is the rating of usefulness of the User's Manual and other associated materials?

The User Manual I have presently is dated 2007. The manual consists of 66 pages. The translation is better than 90% of Chinese manuals; better than other Asian manuals; and better than some manuals translated from Japanese, such as Mimaki. But all manuals should be proofread by an outside person who speaks UK English (if they sell to English-speaking Europe) and needs to be proofread by a native American speaker (if they intend to send to America or Canada). It would take a grand total of 1 hour to proofread the manual and another hour to add the improvements in spelling and diction.

79. Is there a glossary in the User's Manual?

There is no glossary.

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

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

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

There are no cut-away drawings; there are otherwise not many other type of drawings either. Features are pointed to in photographs of the overall printer.

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

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

TRAINING

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

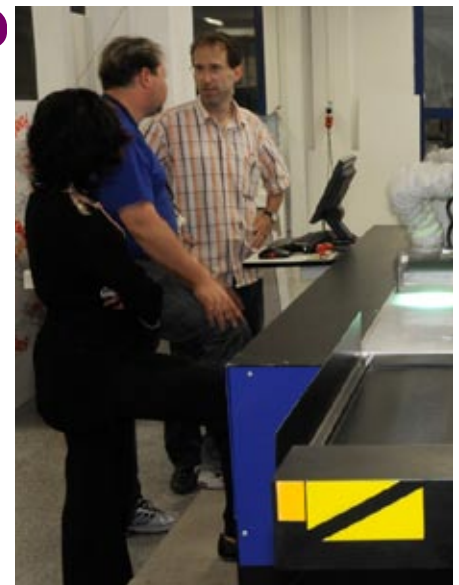
Yes, color management and operational training along with learning how to eliminate minor problems.

84. 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).

85. Is classroom training available?

No, classroom training is not common.



Factory training is an option.

86. Is factory training available?

Distributors get trained at GRAPO. Customers can be trained at GRAPO factory too.

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

87. What on-line training is available?

There is on-line question & answer service 24 hours a day (5 people rotate).

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

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

That can be arranged too. About every 3 to 6 months someone from the factory arrives to show new applications.

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

GRAPO covers all training expenses for the initial purchaser of the new printer.

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

3 hours as the printheads have air bubbles trapped inside due to transportation. Three hours are enough to purge them out. The printer is ready in a period of 3 to 4 days, but it is best to wait until the 5th day to realistically be able to print commercial work by yourself.

It is worth pointing out that expensive printers such as the Luscher may require many weeks before the operator learns the complex software and hardware well enough to produce sellable output.

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.

91. How much of a learning curve is there?

Since this is not a complicated printer, it is easy to learn.

TECH SUPPORT & WARRANTY**92. What is the original warranty period?**

Two years including printhead. This is one of the best warranties in the industry.

If you only get six months warranty, either the manufacturer sees this as a cash cow, or (if the printer is made in China), the distributor is nervous that so many of the printers will break down that they can't afford to warranty it for more than six months.

But if a manufacturer knows their printer is well made, then they will be willing to warranty it up front for two years. Just realize that some features such as warranty terms are often different in various countries and are subject to negotiation.

93. Does it include parts, labor, printheads?

It does only if you use GRAPO ink. Damaged heads are tested by KonicaMinolta to determine whose fault caused the demise of the printhead.

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

The advantage of GRAPO tech support people is that (for their Octopus combo models) they use the same printers themselves that they manufacture. So they know the reality of what to expect when the printer is in a sign shop environment. It is probable that the GRAPO sign printing company will also use their own flatbeds. As this occurs they will gain experience with this new flatbed also, the same as they already have for their Octopus.

With Gandinnovations I know many of their tech support engineers personally. There are plenty of Gandy tech support people, all highly trained and they know their printers inside out. With ColorSpan I know some of their tech support people personally as well. Plus I hear back from print shop owners when they praise the telephone support. One owner said the printer per se runs just fine without much tech support anyway.

I do not yet know the GRAPO tech support engineers that are out in the field (in the various countries around Europe). And until it is possible to undertake site-visit case studies of actual sign shops that have these printers at work, we can't realistically report back on what tech support is really like. So clearly several site-visits would be the next logical step, as soon as funding is available.

95. What training does my tech support person have? Is he factory trained? In what language? How many tech support people are available to cover the US (or Canada...)?

5 days training and in English. GRAPO tends to do things directly from the factory. Having visited their factory I can state that their people are competent.

96. What is wait time to speak with a support technician?

No significant waiting time; tech support is available 24hrs / 7days.

97. What happens if the tech support from your local distributor is uninspired or inadequate? Can you telephone the manufacturer directly? If so, will be manufacturer actively assist you, or only begrudgingly?

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

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

98. Can the manufacturer remotely diagnose the printer?

No. Remote diagnosis is rare, and not available on any mid-range UV-curable inkjet printer.

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

Czech, and English.

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

Tech support should be provided by the distributor, but in countries near the Czech Republic the manufacturer can also provide tech support.

101. Do spare parts come from another country? If so, what is the wait time?

Spare parts 7 days, inks 7 days, printer 25-30 days.

102. How far does tech support person have to travel to reach my printer?

There are tech support reps in Prague, Vienna and Milano.

CLEANING & MAINTENANCE NEEDS

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

At left, you open a hinged drop-down door. The heads are in a normal position so access is acceptable. The printer that has difficult access for cleaning its heads is the Luscher JetPrint.

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

Flush (purge), then wipe, but with a foam tip; not with a cloth. The Konica heads are more delicate than Xaar heads and should not be rubbed with a cloth.

The operator has the option of electronic purge or manual purge. Manual purge is done when the carriage is on the parking station.

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

The purge button is easy to access. There is one purge button for each color. Manual purge buttons are in a row of four on top of the carriage.



The purge has to be manual using buttons from each color.

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

You should purge once in the morning and once at night. Otherwise, keep an eye on quality.

You can have system set to purge & clean after a preset number of passes.

107. Is purging done with ink, or with a flush solution?

All purging is done with ink. There is no flush system with a solvent material.

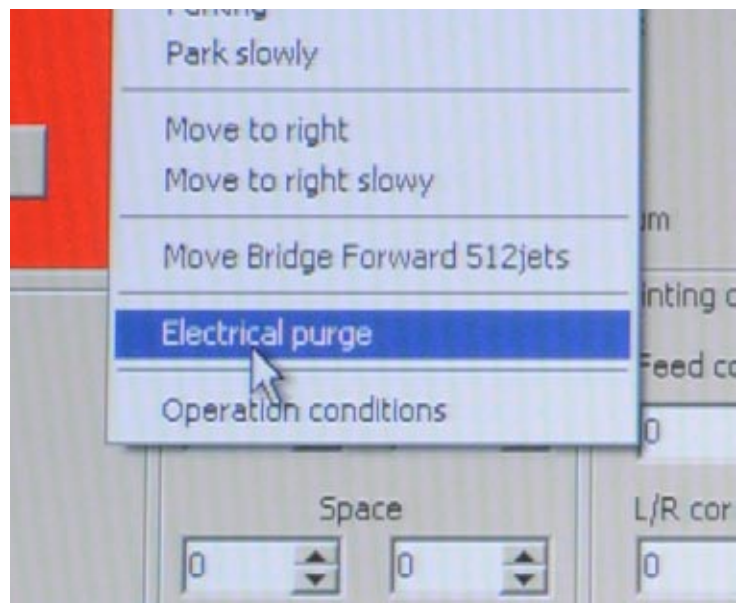
108. Is there a capping station?

If you wish you can lower the carriage down onto cloth soaked in cleaning liquid, but there is no formal capping station.

109. Are there wipers?

No wipers. A nozzle plate is very sensitive. Most engineers no longer put wipers onto their printhead cleaning systems since an iffy wiper can be worse than no wiper at all. If the Mimaki JF-1631 has a wiper, that is one of its many minor issues that end-users write about.

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.



You also have the option to do software-based purge.

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

No.

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

The service station and parking station are both at the left.

112. Is the capping station the same as the service area or the parking area? Or separate from both?

A capping station can be “created” by simply lowering the heads onto the table.

113. Does this printer spit, or “weep” (“flash”) ink at regular intervals?

Yes, there is an auto-purge system.

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

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

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

114. 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?

Controlled from the keyboard.

115. Does the manufacturer provide any special cleaning tools?

Yes.

116. Does the manufacturer provide any special cleaning liquids?

Yes, two liters.



The capping station is in the same place as the parking station. Cleaning is also done here.

MAINTENANCE

117. What daily maintenance is required at night?

It's easy: cool down the lamps (check status in software). Purge and clean (wipe gently).

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

After three hours of steady use purge the machine. The machine itself makes its own purging every so many passes (via user software).

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

Keep the table clean. It is natural that ink overspray will build up on any table.

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

Each color of ink has one filter. Change after six months.

121. How expensive is replacement of the filters?

A modest 2 Euros.

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

Regular cleaning of the printheads.

123. What maintenance do the UV lamps require, such as cleaning the quartz?

Cleaning the quartz is not something you would normally do.

124. How much time, media, and ink are used during regular cleaning, calibration, and maintenance?

15 minutes a day.

125. How long can the printer sit unused?

About 20 minutes.

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.



You should lower the heads into a soaked cloth to maintain the heads.

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

The main procedure is to lower the heads onto the flush-soaked cloth.

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

127. 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.

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

There is a horizontal red wire running along three sides of the table. If you pull on the wire the printer stops. There is also a red stop button on the control table.



Above, you can see the emergency stop rope. This system is becoming popular among industrial size UV printers.

The advantage of this feature is that, in any event, the operator has a mechanism to stop the printer regardless of where he is standing at the moment he needs to stop the machine. In other words, the operator does not need to run to the main operation area to stop the printer.



129. Is there auto-shut down? If so, what triggers it?

Pulling out the red emergency button.

130. 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.

131. How much ozone is produced?

The printer produced such small amount of ozone, that GRAPO decided it was not worth to have an anti-ozone system.

132. Is the machine enclosed, or exposed?

Exposed.

133. 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 it's hood can never close down tightly onto the platen area. The design must allow space; this space should be closed off with a skirt. Some printers use flaps or rubber like material; other printers use skirts of brush-like material.

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).

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

Since there is no hood, there is no skirt. All exposed dedicated flatbeds should find other ways to shield UV light.

135. What system of ventilation or exhaust system is built into the printer? Or if not required, what would common sense dictate? Is it adequate to clear the work area of gasses and fumes?

There is no system of ventilation built in the printer.

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

With eight large vacuum pumps, noise may become an issue. This kind of noise level is true with other UV-curable printers as well.

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.

137. What moving parts might hit a person if they are standing near the printer?

At Sign Spain show (Madrid, October 2006), I noticed that the bedigital version of this GRAPO Manta had brightly colored warning tape on the parts of the printhead carriage assembly that stick out on either side. This way you can see it coming and get out of the way. This kind of warning is missing on most other flatbeds.



Not many printers have a means of warning people of moving parts that might hit a person. The only similar feature on other printers is the beacon light on the Dilli printers, but these only tell you that the printer is functioning.

138. 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.

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

GRAPO recommends to use gloves and safety glasses (provided with the printer)

The tables of Oce, Mimaki, and others are bright polished (aluminum?). That makes no sense to have an almost mirror-like surface directly below your UV lamps.

PRINthead TECHNOLOGY

140. Which brand printhead is used?

Konica Minolta.

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.

141. Which model of printhead is used

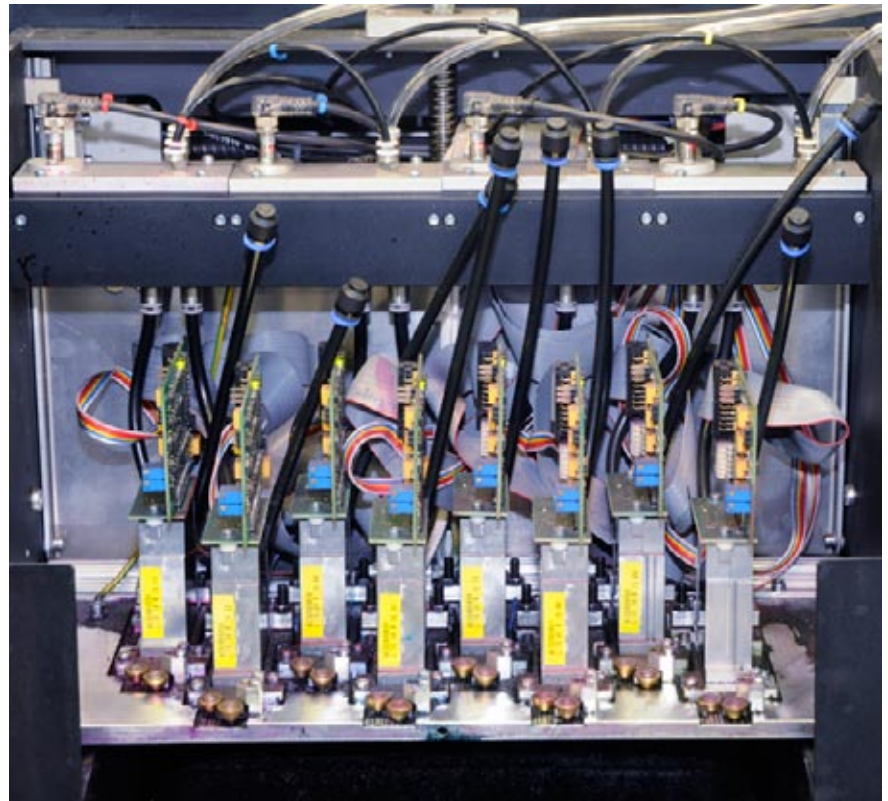
You have two options

- KM 512 LH (from which you can select whether you wish 14pl or 28pl heads).
- KM 512 MH (which features 42pl).

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

Konica KM512L	Konica KM512M
Gerber Ion	
	Agfa Anapurna M
	GCC 183UV
	GCC K100UV
	Dilli Neo Titan

The only printhead problems that I hear of consistently are those of the Toshiba Tec heads on the Mimaki JF-1631 and JF-1610. In order to figure out whether the problem is the heads or the ink system on the Miamki, I checked with another printer manufacturer who uses the identical printheads. They have no problems other than that these heads are very finicky with things like hair. So the issue is not entirely with the T-Tec heads, but with the entire ink plumbing and wiper system on the JF-series of UV flatbeds. No GRAPO printer uses these heads anyway.



With Konica Minolta you get to choose between KM 512 LH and KM 512 MH. Here you can see the eight heads.

143. How many nozzles per printhead?

512 nozzles.

144. How many printheads per color?

Two.

145. How many total number of printheads?

Eight.

PRINTHEAD DPI & Features

146. What is the drop size in picoliters?

Originally GRAPO had experimented with a 4pl head but it was not acceptable because it was too slow, so they opted for 14pl.

147. Is there variable droplet capability?

Yes, through software.

148. 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 is 720.

149. How many passes can this printer achieve?

1 to 16.

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).

150. 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).



The quality of your print job will depend on the number of passes you select.

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

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

Bi-DIRECTIONAL VS Uni-DIRECTIONAL PRINTING

151. Is printing bi-directional or uni-directional? What are the different results in speed; in quality?

Printing is both, bi-directional and uni-directional. You can switch while still printing.

152. Which materials really ought to be printed at the uni-directional mode?

Acrylic or glass.

153. Which materials have to be printed at multiple passes?

Depends on the quality needed to achieve.

PRINTHEAD Positioning

154. 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.

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

You raise the printheads manually.

156. Is there an alarm system to stop the head from hitting substrate if head is not high enough?

The system will stop if the material is too high. There is a sensor for this purpose.

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

The printheads are recessed in the base plate of the carriage.



As you can see in the base plate, the printheads are staggered.

PRINTHEAD: Associated Features

158. Is there a heater associated with each printhead?

The carriage base plate is heated. Each printhead has a heat sensor.

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

The whole carriage is heated, but there is no specific sub-tank heater.

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 an economical way that early printers did their heating. I don't know of many UV-curable inkjet printer manufacturer that uses a heated plate to heat their ink (but with 45 manufacturers, there are always surprises). What counts is whether it works: the GRAPO Manta works fine (after all, the manufacturer uses their own printers to run a regular sign printing shop, so they have no incentive to make an inadequate printer).

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

Yes, through software.

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

Yes.

162. Is the negative pressure user variable?

Yes, manually set at present.

PRINTHEAD Life Expectancy

163. How many nozzles have to be out before the manufacturer will replace the head under warranty?

This depends on the situation.

164. If this piezo head fails, who is responsible for paying for replacement heads?

This depends on the situation (on what caused the failure and whose fault it was, head or the operator).

165. Is there a limit to the number of printhead failures that are covered over a unit of limited time?

No limit.

166. How can head strikes be avoided?

In the past, heads may have occasionally had a nozzle plate peeling off, but that was fixed by recessing the nozzle plate. The nozzle plate is also kept a little bit flexible.

167. What does each printhead cost to replace?

About 1725 Euros.

SUBSTRATES

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

This is a dedicated flatbed printer.

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

Yes, it can be done.

170. 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 the fault of the printer but a result of the fact that each different kind of material feeds slightly differently.

171. Can you adjust carriage speed?

Yes.



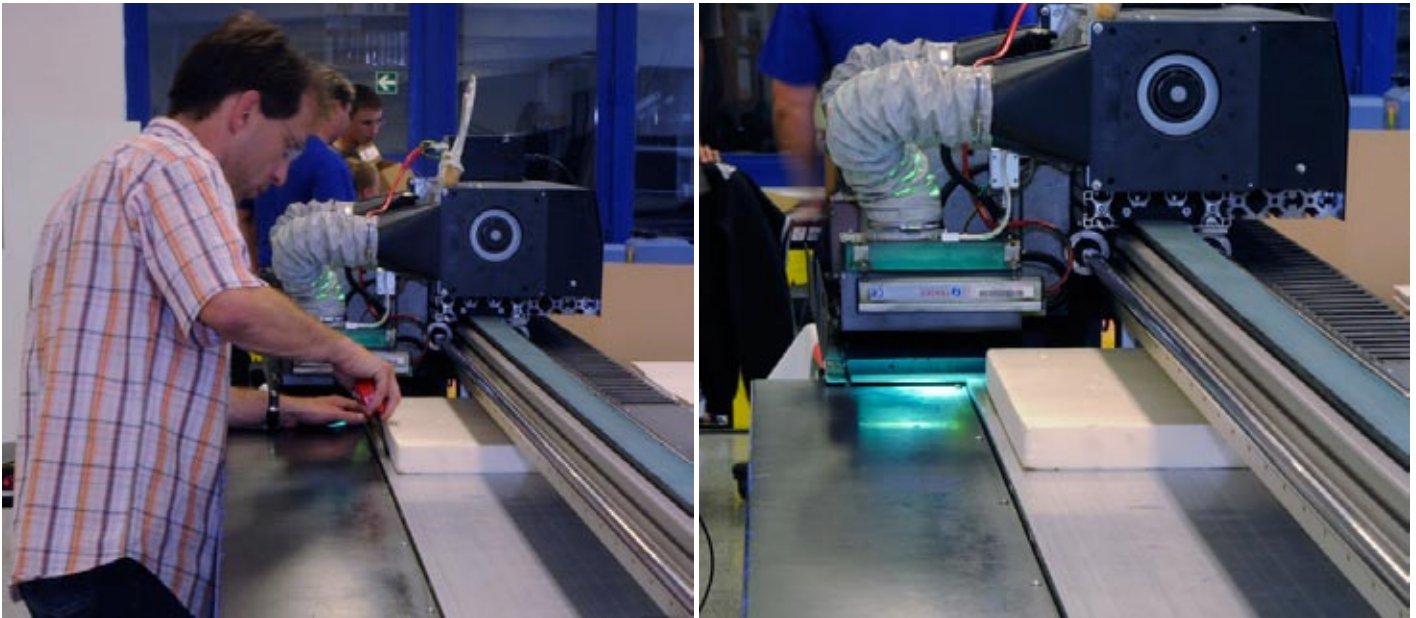
The Grapo Manta was built from the ground up to print rigid materials.

LOADING MEDIA
172. What thickness can this printer handle?

6 cm. This is better than most others, which tend to handle only 5 cm.

173. 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").



6 cm is more than what most UV flatbeds can handle. You need to measure by hand the substrate height. Although the printheads are recessed in the nozzle plate, setting the proper carriage height will keep it from hitting the substrate and loosing the print job.

SUBSTRATES, Materials, Applications, and Issues
174. What materials does the manufacturer list?

In the Operation Manual, GRAPO lists "materials with excellent adhesion"

- cardboard,
- corrugated cardboard,
- paper,
- dibond (polyester coated aluminium),
- epoxy coatings,
- foamcore,
- leather,
- metal,
- plastic (ABS, PVC, Forex-recycled PVC, Polystyrene),
- self-adhesive films,
- stone,
- most textile materials,
- wood.



Samples printed on with the Manta at Grafo factory visit.

175. What materials can this printer print on perfectly?

Foam-core material would be good with this system.

176. What materials can this printer print on okay?

Tiles, vinyl (if cut to size).

It helps if the material is clean, homogeneous surface, and should all be the same thickness. Here is the official GRAPO list of "Materials with adverage adhesion." This is very honest of them to state it in this manner.

- polyethylen,
- polypropylen,
- polyester (rigid boards, textile, banners),
- polycarbonate,
- plexiglas,
- mineral
- glass and ceramics

In this materials is possible in the above mentioned materials it is to increase surface tension by using appropriate PRIMERS.

Forex (plastic PVC sheets), you need to test yourself, because ink changes every year. It is listed by GRAPO as "excellent adhesion" but double-check by your own usage tests.





Nicholas Hellmuth showing photos of FLAAR archaeology archive printed on with the Manta.

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

You can print on canvas, but otherwise flatbed printers are not really intended for fabrics (the vacuum can't suck a fabric flat).

PVC and foam (sandwich kind of materials) need to be handled with intelligence. Heat gets into foam and does not get dissipated. Because of this heat, some edges and corners could curl. The Grapo Manta prints beautifully on these materials, but you must be more careful.

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

If you need to print flag material, do this on a combo (such as the GRAPO Octopus), hybrid, or dedicated roll-to-roll UV printer.

179. Can you print on mirrors?

Yes, one customer prints lots of Finlandia Vodka ads on mirrors.

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

Leather jackets.



181. Heat concerns: will the heat generated by the UV curing lamps cause adverse effects to some delicate forms of heat-sensitive media? Which materials might curl, distort or discolor from the heat?

Heat is an issue for sensitive materials, so try to use just one lamp.

Heat sensitive materials would include polyethylene, polypropylene, shrink-wrap, very thin and thermal sensitive papers, plastic coated cartons, PVC and aluminum foil (www.dotprint.com/fgen/prod1297.htm).

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

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

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

182. 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?

The machine has an anti-static bar, or you can opt for a second bar on, for certain special materials. You may need to clean off the anti-static system every six months.

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.

GRAPO is very open about reality: "generally materials, covered by a foil, which has to be removed before printing. Have a high charge that even an antistatic bar can't eliminate the charge. We recommend to clean the material with alcohol, before printing, so that the charge is lowered."

183. What happens in very dry weather (low humidity), especially in winter with central heating?

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

SUBSTRATES: Cleaning, Priming, Preparation

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

It is better to clean before printing so as to eliminate fingerprints

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.

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

The company that supplies the ink, Sun, also supplies primers for Plexiglas, glass, and ceramic (tiles). The manual lists two primers:

- Crystal AEP 0526 – primer for Acrylic media (plexiglass, Perspex etc.)
- Crystal AEP 0527 – primer for Polycarbonate media (Lexan, Macrolon, etc.)



Primer spray.

There are two kinds of pre-treatment liquids you can choose from:

- A substance you can dissolve in another liquid
- You can buy a spray

There is also a glass adhesion primer available.

186. 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.

For some materials such as polypropylene and polystyrene it helps to have an anti-static “gun.” Polypropylene (Olefinic plastics) Coroplast is trademark for one form of corrugated plastic (polypropylene).

Corona treatment in reality may not actually function because the material will pick up a considerable charge.

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).

187. 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 can help when printing vehicle wrap.

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

SUBSTRATES: General Concerns

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

The machine prints ok on Lexan and polypropylene, there is no major problem, but if in doubt, use a primer. See, this company is honest, because they themselves, as a printshop, use their own printers to do signage on diverse materials.

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

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

Avoid trying to print on some finishes such as on polythene.

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

Skew will be something you have to be careful about with any printer that is not a dedicated flatbed. A dedicated flatbed is a printer where the media does not move; instead the media stays fixed to a vacuum table and the printhead (or the entire table) moves. But not all dedicated flatbeds can accept roll-to-roll materials.

Skew results because no one single feeding system can accommodate all kinds of surface characteristics or thicknesses of materials.

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

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

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

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

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

If warping is an issue with some material then tape the edges. I noticed that the Mimaki operator was taping the edges of everything he was printing on (at Sign Spain show). This is not a good sign that he had to tape every single sheet.... This is too labor intensive.

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

Acclimatization would be needed mainly if the materials are kept in humid or wet conditions; on the other hand, try not to store materials in the sun.

WHAT IS THE INTENDED MARKET FOR THIS PRINTER?

193. Are other markets buying this printer that were unexpected?

One company prints on glass airplane models (they print the wings).

In Australia, one person prints on old furniture.

194. What markets that printshops aim for might be prospective buyers of prints from this printer?

Ceramic tiles here in Czech Republic.

APPLICATIONS

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

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.

196. What other kinds of applications can you print?

Wooden desks.

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

Yes you have the option to print with double-density.



Ceramic tiles printed on at Grapo Factory by the Manta. The photographs used here were taken by Dr. Nicholas Hellmuth in Guatemala, Central America.

INK

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

Since this is a dedicated flatbed printer the ink is for rigid materials. Only one ink is available.

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

At present only Mimaki and Gandinnovations offer a special heat-formable UV-cured ink. For some other printers you can buy after-market heat-formable inks.

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

The current model is four colors. Eight heads are under consideration, but speed would be reduced by half.

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

12 months from date of manufacture.

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.

202. What company makes the inks? Choices include DuPont, Jetrion (now InkWare/VUTEk), Hexion, Sericol, Sun, Triangle, KonicaMinolta, Toyo, Tetenal and several others.

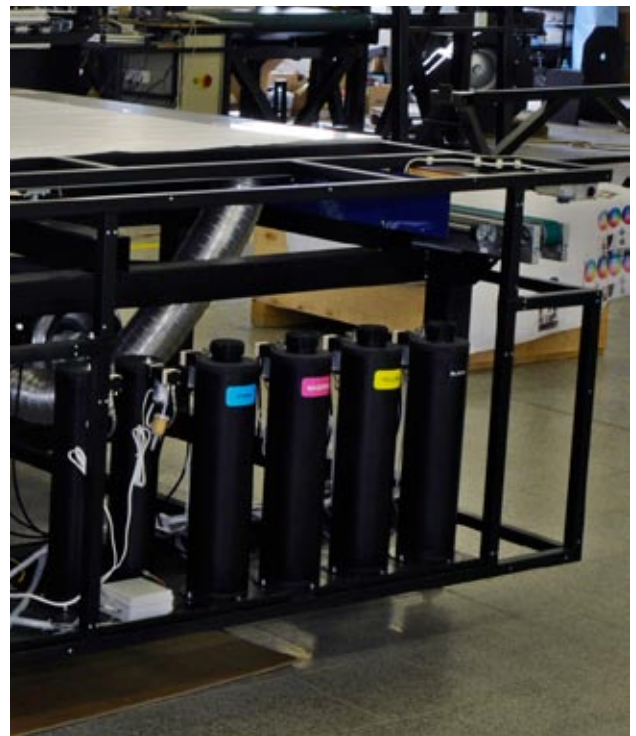
The ink comes from Sun.

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

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

204. Where are the printer's ink containers located? Front, back, or sides?

Ink containers are located at the back.



The cylindrical containers are located at the back.

INK: White & Varnish

205. Is white ink available?

No white ink. White ink is difficult to handle and in reality is rarely used.

INK Cost

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

Ink comes in 1-liter bottles. The ink container in the printer holds 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 uses Epson printheads: one Eastech printer tried, but it is not widely used.

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

Ink was originally 175 Euros per liter for a single liter. Now there are two different brands of ink you can select: the economy UV ink (perhaps average of 90 Euros per liter) and the premium UV ink (at the price of UV ink for other printers, see following). The price depends on whether you buy one liter at a time, or 10 liters at a time, or 100 liters at a time. The more ink you buy at one time, the lower the price per liter.

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.

208. 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. Each print task shows the amount of ink used for each color.

209. How much ink is used to print a square unit?

GRAPO provides helpful figures here:

- 2 passes 3 – 5ml/m²
- 3 passes 6ml/m²
- 4 passes 8ml/m²
- 5 passes 10ml/m²
- 6 passes 12ml/m²
- 8 passes 15ml/m²

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

There is not really a separate waste container. Purged ink drips onto an open tray; you empty the tray when you notice it needs emptying.

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

Visually, you can see the level any time you open the door.

212. 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?

On the monitor of your PC through the printer software.



Ink that is purged goes into a drip tray.

213. Is there an out-of-ink alarm? Is there a warning before actually being out of ink?

Yes. Yes once the tank has less than 0.5ml the PC shows an alarm

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

Yes. Hot swap and changing from bi-directional to uni-directional while printing , makes you think this printer is ready to satisfy industrial loads of work.

INK: Supply System, Tubing, Filters, etc

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

You pour the new ink into the on-board container. Most printer designers are getting away from this system in order to avoid gelling; see the note below.

216. What is the situation with the ink gelling?

So far, no gelling problems have been reported.

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.

217. What filters are on the ink system to trap particles or trap gelled ink?

Each ink line has one filter.

218. How often do the ink filters have to be checked? Cleaned? Changed?

Depends on the amount of usage of printer.

219. What does a new ink filter cost?

2 Euros, a fair price.

220. How is air removed from the ink delivery system and/or removed from the printhead?

Self automated through the printheads.

221. Is there an issue with “ink starvation?”

Not an issue. In part this is because the machine has two ink level sensors, one in the tanks and another in the sub-tanks.

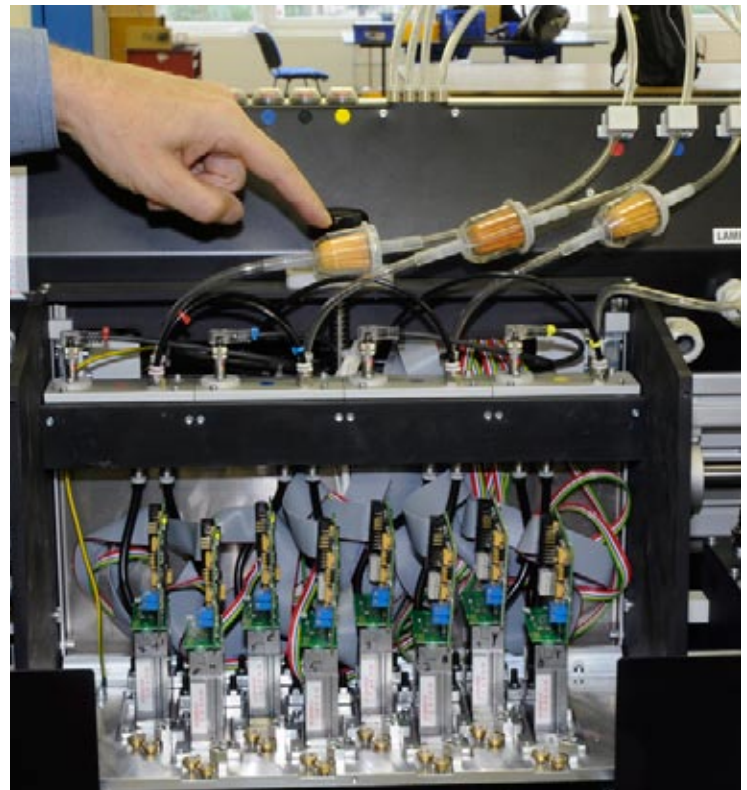
“Ink starvation” means that not enough ink can get to the printheads in fast printing modes. Ink starvation is a real issue that affects even some quarter-million dollar printers. So you need to check with end-users to see if they have issues with ink starvation.

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

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).

223. 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.



Filtering the ink is crucial to avoid clogged nozzles.

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

Ink is heated in two places: pre-heating in sub-tanks near head, and plate that holds the printheads is heated. The UV version of the Minolta printhead has a built-in heater. This is all user-controlled.

225. To what degree is the ink heated?

Ink is heated in two places: pre-heating in sub-tanks near head, and plate that holds the printheads is heated. The UV version of the Minolta printhead has a built-in heater. This is all user-controlled.

226. Can the end-user vary the printhead temperature, or is the temperature fixed?

Yes it is user variable.

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.

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

15 minutes to heat the ink and the heads.

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

"No issue so far." But the operator should keep underside cleaned.

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

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

This is the amount of ink that you may be breathing if the workplace is not adequately ventilated.

INK: Longevity

229. What is the longevity outdoors? What about in the full sun in direct sunlight?

In some cases the ink may last longer than the material on which it is printed.

230. What about solvents such as cleaning solvents? Do they mar, dull, or wash away the ink or change the surface quality, especially on vehicle wrap?

- Ammonia (in Windex and comparable cleaning liquids)
- Acetone
- Cleaning alcohol (may be an issue if you print a lot)
- Gasoline
- Soap and water with sponge
- Soap and water with a broom (frequently used to clean vehicle wraps in Latin America, for example)
- Scotch-tape pull-off test

INK Color Gamut

231. Which colors print best?

Color spectrum is typical for most other UV-cured printers (especially since most also use ink from SUN). The following colors are attractive:

- Tan
- Rust
- Brown
- Pepsi blue
- Dark green
- Concrete
- Stone
- Gold and aluminum (metallic colors such as watches)

232. Which colors print poorly or not at all?

- Green may be too yellow, but some yellows are very good.
- Some reds are too orange (as is the issue on 75% of all UV-cured inks today).

So a bottle of Heinz ketchup is too orange but the green stem and leaf of the tomatoes are good (because they are dark green; light green would tend to have too much yellow).



THE UV CURING LAMPS

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

There is one traditional set of two lamps: one on each side of the printhead area.

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.

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

Traditional mercury arc lamps.

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



The Manta uses two industrial UV lamps.

235. How many watts are the lamps?

1 Kilowatt each lamp.

236. What is warm up time?

Depending on the status, 160 seconds.

237. What brand of lamp is used?

Theimer (Germany).

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.



Theimer UV curing lamps offer European quality. The UV lamps made in China tend not to work and often are impossible to replace locally anywhere outside China!

238. How many lamps does the printer use?

Two is the usual number of lamps. Some cheap Chinese printers use only one lamp. Mimaki uses one lamp on several of their narrow-format UV printers to avoid the lawnmower effect that is caused by bi-directional printing (bi-directional print requires two lamps, one for each direction of ink laydown by the printer carriage).

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

239. 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?

Just on or off.

240. 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. 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.

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

Lamps are warranted for 600-800 hours.

242. 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.

243. 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.

244. How do you keep track of lamp-hours?

It is specified on the software, visible on the monitor of the PC.

245. How much does each replacement lamp cost?

375 Euros for end user.

246. Is the UV curing assembly (lamp included) user-replaceable? If so, how easily or difficult is self replacement?

Yes, It has to be untightened with just 1 screw so it can be replaced by the end-user.

247. What is the true drying (curing) time of the inks used with this set of lamps? What factors influence the true (total) drying time?

No UV ink really cures within seconds. Some colors, depending on how thick the ink is laid down, may cure “instantly.” But several factors may result in a cure that takes 24 hours, 48 hours, or weeks. If you set the print mode for “glossy” this reduces the lamp intensity. These prints will outgas for weeks.

UV LAMPS: Cooling

248. Are there shutters?

Yes.

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.

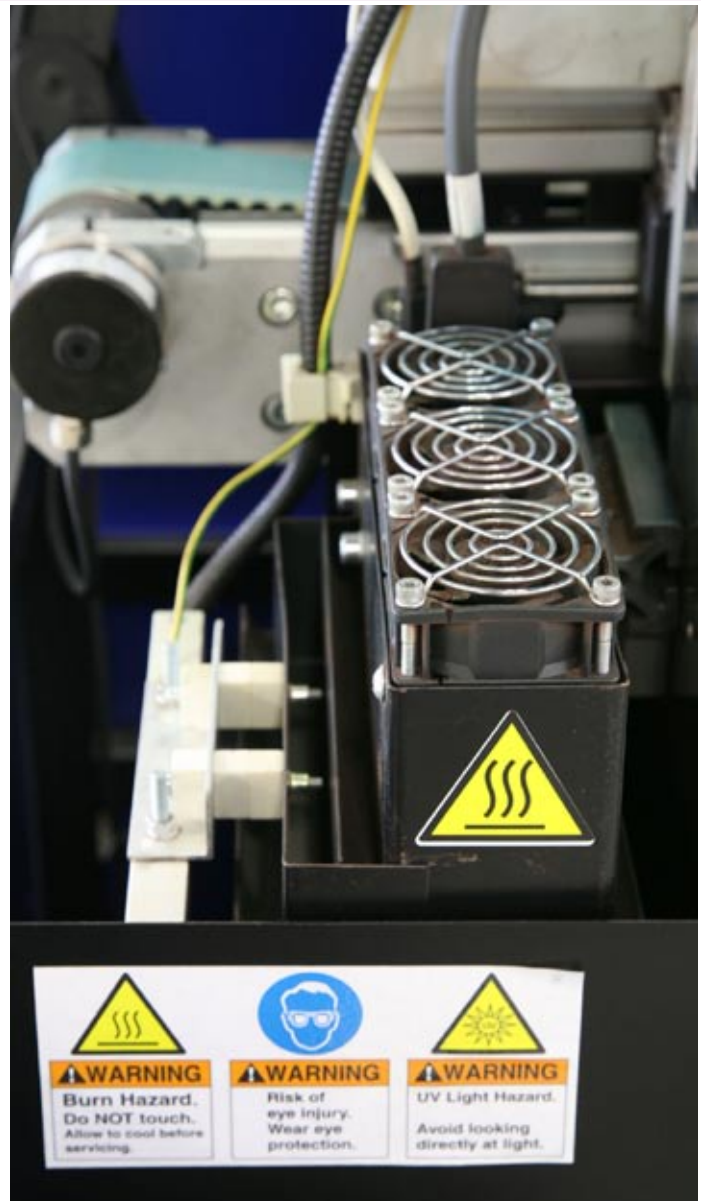
249. How often do the shutters stick?

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

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

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

Fans, three fans per lamp. Air passes between two layers of glass (or quartz). This keeps the temperature to about 40 degrees C on most materials. So you can have a comparison, it was 43 degrees C in Athens, Greece during the Summer Olympics when I was testing digital cameras there.



251. How many fans are there per lamp?

One fan with “push” duct to get air inside.

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

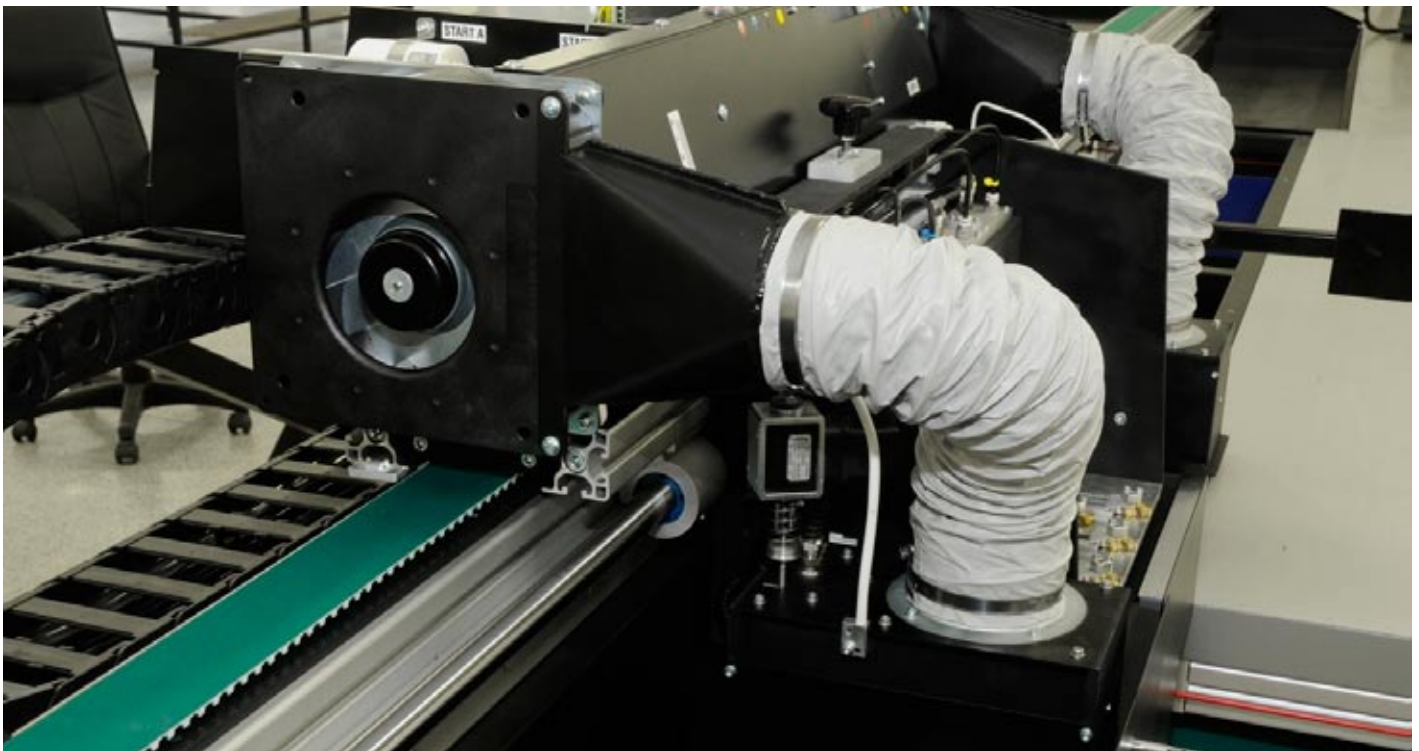
In the past, the settings used to be on, off, low. Currently the printer only has On and Off. There is no need of a low mode if the starters are outside.

253. Are there fans elsewhere in the printhead carriage area?

Not needed, it’s all open.

254. 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.



You can see the fan and the duct that drives air into the lamp.

UV LAMPS: Reflectors

255. What kind of reflectors are used?

“Cold mirror” reflectors lets the UV light come through but eliminates some of the IR heat.

256. Do the lamps have water-based cooling?

Reflectors are normal; water-based cooling is available only in printers costing over \$400,000.

257. How often do you need to replace the reflectors? What does this cost?

Once a year.

RIP SOFTWARE & Printer Software

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

In the beginning the RIP was from GRAPO itself. But now you can select from major RIP software brands.

COLOR MANAGEMENT FEATURES

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

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

PRODUCTIVITY & ROI (Return on Investment)

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

This aspect is not listed in any spec sheet. You learn this only if you spend an entire day in the demo room, but doing the loading and printhead height calibration yourself. Then you get a further comparable reality check when you start production in your own print shop.



Loading time can be as important as printing time when measuring production goals.

This factor will make or break your production goals. It makes little difference how fast a printer will print if you have to spend 7 frenzied minutes to align and set-up each new print job by hand.

So find one of these printers that is already installed, and learn from them what productivity obstacles exist and what real throughput is.

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

Yes, this is a European-made printer that is intended for sustained use.

When we visit print shops in the US that have Chinese printers, we learn that the cheaper brands of Chinese-made UV printers can't hold up to even one shift a day every day and would wear out if you attempted to run them all day all week.

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

No, this printer is made for serious production; this is not a low-bid printer that can't hold up to constant use.

ADVERTISING CLAIMS:

263. What is the difference between problems with this new model and problems with the older previous model?

Before linear recorder had banding. Seal of sub-tank had to be replaced, now it has a new construction that only needs changing every 6 months.

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

This is mainly with Chinese-made printers. But, any time you are seriously thinking of any printer it is essential to learn what the recall or return rate is. In other words: how many printshops return this printer because it is either not what they expected or not what they need.

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

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

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

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

GENERAL CONSIDERATIONS

265. How many printers of this model are in use; in the USA; in the rest of the world?

Over 100 of these Manta flatbed printers have been sold, keeping in mind none are in the US because GRAPO is a sign printing company, and designs and manufacturers these printers for their own in-house use. They sell a few extra printers to other printshops who have learned that these printers can also be obtained by anyone who really wants one.

COMPARISONS WITH OTHER PRINTERS

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

Print shop owners would first seek to understand the differences, pros, and cons of a dedicated flatbed compared with a combo or hybrid printer per se. The NEOLT would be a European hybrid printer, or any of the cheap Chinese printers: Infiniti, Flora. But the Flora has a history of uncertain functionality, especially their solvent ink printers, on which their hybrid UV printers are based. A hybrid that functions well would be the ColorSpan 72UVX. Combo printers would be the ColorSpan 9840uv model.

If someone decides for a dedicated flatbed, then the choices would be an Oce 250 GT or Mimaki JF-1631.

The NUR Tempo, Luscher JetPrint, Gandinnovations Jeti, Inca Spyder, Inca Columbia are flatbeds in a substantially higher price range. You could buy two GRAPO Mantas for the price of an Inca machine.

FLAAR Reports are available on each and every one of these printers. We also have site-visit case studies of the Luscher and Gandinnovations (and on the ColorSpan 72 and Infiniti).

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

Mimaki showed a prototype UV flatbed at ISA and IPEX 2006. GRAPO was already showing its beta-stage Manta at IPEX (GRAPO does not yet exhibit nor sell in the USA). By autumn the Oce flatbed prototype was presented (at ISA trade show).

Today, in autumn 2008, the Mimaki JF-1631 printer is being phased out due to having too many elderly and old-fashioned components (see full FLAAR Report for the issues). The Gerber Solara ion, whose launch showed so much promise, has continued issues with cationic ink and cold core, so has fizzled to the point that its future varies from questionable to unsure (see full FLAAR Report on UV ink and separate FLAAR Report on Gerber ion).

SUMMARY: Image Quality Issues: Banding

268. What causes banding in this particular system?

High density of ink.

269. How can banding be avoided?

Lowering the ink load.

More passes tend to get rid of banding on almost any and all inkjet printers. Of course it helps if the machine is precision engineered so you don't get much banding at four passes and above. Banding at two passes is normal.

SUMMARY: Image Quality Issues: General

270. Is text sharp or fuzzy? What is the smallest text that you can easily read?

9 pt text is quite good.

271. Can the system produce glossy finish? To what degree is surface glossiness an issue? Can you select glossy or matte or do you get what the system provides and that is all? If you get only one, or the other, which is it you get?

There are tricks to achieve both. The slower you cure (this can be controlled by the operator through the Pc attached). The glossier the print is. The faster the printing the matter the finish is.

272. Does achieving glossy take more time to print? Does glossy output outgas more, and for a longer time (because it is not cured as thoroughly with UV light?).

This can be achieved by turning down the UV lamps to cure slowly, this of course will take a longer time to get the finished print.

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

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

274. What about abrasion (scratch) resistance? How susceptible is the ink to abrasion?

"As the ink is specially for rigid material, it has a high resistance to abrasion."

CONCLUSIONS:

275. 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.

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

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

With 80 models of UV-curable inkjet printers from 35 manufacturers it is not realistic to undertake site-visits of every printer on the planet, but as soon as the opportunity presents itself to continue our study of the GRAPO Manta (and Octopus), in-situ, on location in a European print shop, we will do so.

Conclusions

Pros

It is a positive factor to be a simple machine. The ColorSpan 72UVR and UVX are simple, and have sold 900 units. The Zund 215 is complex and has sold half that. Complexity means higher cost and more parts are likely to get out of synch with each other. Complexity means more to learn.

There are now more and more dedicated flatbed UV-curable inkjet printers because it's a challenge to create a roll-to-roll UV printer that can handle flat rigid material as perfectly as it can handle roll-fed material.

Most UV printers don't want to be unused for more than two or three days. The GRAPO can hold up to 15 days of not being used without complex, time-wasting, and ink-wasting storage procedures that are required on most other brands.

Some companies manufacturer printers in order to show good financial return to the stock market and investors. Their only need is to make profit, which usually results the less meat they build into the printer (low cost structure equals higher profit (until end-users find out about this)).

Gandinnovations makes great printers because James Gandy has his name on the product and wants only the best.

GRAPO makes UV printers in order to run their own printshop. They started out with a quirky Mutoh Albatros or compable iffy solvent printer years ago, had endless issues, and then saw the Perfect Print (predecessor of the Zund 215). They figured they could learn from Xaar they could make their own printer work better if they designed it from scratch, so they built the GRAPO Octopus, which was featured in the Xaar booth at DRUPA 2004. Then two years later they added a dedicated flatbed, the Manta.

There are row after row of their own printers in their own printshop. Now that they have a good printer for their own use, they make a few extra and sell these as an additional revenue stream.

The advantage of having a printer made by a signage company is that they can be honest about which materials print well, and which print acceptably but not perfectly. Too many other UV companies pretend their printers can "print on everything."

So far the performance of the GRAPO Manta, as an industrial-strength flatbed printer, has been better in terms of ink usage, lack of printhead issues, and general up-time and reliability than the Mimaki JF-1631.

The Manta is full European size, 2 x 3 meters. Many American printers are only 4x8 feet in size, which are not large enough for European needs.

The GRAPO User Manual lists precise printing times for a 2x1 meter board. In general, I rate the GRAPO statistics as more honest than some other other-enthusiastic claims by other manufacturers.

Another strength of GRAPO is that they have a renewed vigor that began during the summer of 2008. This is why I made the time to visit their factory, R&D department, and demo room this second time. The results of the rise of GRAPO will be a new distribution network and a new presence during autumn 2008.

Downsides

Every printer has something you ought to point out in Downsides, even printers that I like. Simplicity naturally has its downside: you have to do some things manually: there is no pin registration.

As soon as I learn any downsides of this printer, I will update this section.

Conclusions

The only way to find out how a printer really works is to undertake a site-visit case study. We have these of the following printers:

- Gandinnovations flatbed UV (two different site-visits).
- Luscher flatbed UV (two different site-visits)
- Infiniti flatbed UV (two different site-visits)
- ColorSpan 72UVR and UVX (multiple site-visits, all in a single report).

These FLAAR Reports are available from www.wide-format-printers.NET.

In the meantime we can say that the GRAPO company made a favorable impression during our inspection of their factory for several days in the Czech Republic in 2006 and again for three days in 2008. The printers are made to European standards. This is not a cheap printer made with counterfeit parts or jerry-rigged components. The management of the company are honorable and capable individuals: they make UV-curable inkjet printers because their parent company is a sign printing company.

Some other printer manufacturers build printers in order to sell ink. GRAPO makes printers to produce signage with a practical machine that is not so complicated that it costs a fortune to manufacturer and requires technicians to keep its multiple parts all running smoothly together.

Most recently updated September 2008.

First posted October 2006. Updated November 2006 and January 2007.

XY Cutters and RIP options

When you have a UV-curable wide-format printer you will eventually learn that an XY flatbed cutter is a useful accessory for thick rigid materials. There are only two leading brands of XY flatbed cutters that are universally considered top of the line: Kongsberg (Esko Artwork) and Zund. I know the Zund cutters better because it was possible to spend two days at the Zund factory in Switzerland. I have not had an opportunity to visit the Kongsberg factory in Norway.

Zund now has a third-generation line of cutters that I first saw during two weeks at DRUPA trade show in Germany (June 2008).

For further information on Zund cutters

contact Greg Lamb, glamb@globalimaginginc.com

If outside the USA, contact Lars.Bendixen@zund.com



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

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, 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, and at FESPA Digital in Geneva.

To learn more about Caldera RIP

contact Joseph MERGUI mergui@caldera.fr

[This report on XY cutters is a free download on all FLAAR web sites \(in the link to free downloads\).](#)

[This report on RIP software for serious UV printers is a free download on all FLAAR web sites \(follow the link to 'free downloads'\)](#)

Reality Check

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

Licensing Information

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

Update Policy

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

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

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

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

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

Please Note

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

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

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.

Citing and Crediting

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

If you intend to quote any portion of a FLAAR review in a PowerPoint presentation, if this is in reference to any product that your company sells or pro-

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

The material in this report is not only copyright, it is also based on years of research. Therefore if you cite or quote a pertinent section, please provide a proper credit, which would be minimally "Nicholas Hellmuth, year, www.FLAAR.org. If the quote is more than a few words then academic tradition would expect that a footnote or entry in your bibliography would reference the complete title. Publisher would be www.FLAAR.org.

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

Legal notice

Inclusion in this study by itself in no way endorses any printer, media, ink, RIP or other digital imaging hardware or software. Equally, exclusion from this study 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 workaround. And not all glitches manifest themselves in all situations, so our evaluator may not have been sufficiently affected that he or she made an issue of any particular situation. Yet such a glitch that we don't emphasize may turn out to be adverse for your different or special application needs.

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

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

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

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others

are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent, eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Our reports are on usability, not on health hazards.

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

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

Results you see at trade shows may not be realistic

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

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

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

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

Factors influencing output

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

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

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

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

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

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

next redesign the system.

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

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

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

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

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

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

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

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

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

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

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

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

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

Realize that a FLAAR Report on a printer is not by itself a recommendation of that printer.

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.

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.

Acknowledgements

Fortunately the university covered some of the operating costs of FLAAR. Thus we do not really have much incentive to pocket hush money from producers of lousy products. 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 is fairly evident rather quickly.

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

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

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

Besides, it does not take any money to see which printers and RIPs function as advertised and which don't. We saw one hyped printer grind to a halt, malfunction, or otherwise publicly display its 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 and for funds to allow us to attend all major international trade shows, which are ideal locations for us to gather information. We thank Drytac, Sun LLC, Raster Printers, LexJet, DYSS, Mutoh Europe, NUR (now part of HP), IP&I, Dilli, Yuhan-Kimberly, InkWin, GCC, Grapo, Durst, Teckwin and Zund 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. Currently our reports on lamination tips are sponsored by Drytac and our publications on eco-solvent ink printers are sponsored by Mutoh Europe. Now (in 2008), we are seeking corporate sponsorship so we can gradually return to making at least 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.

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 350,000+ 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.

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

Contributions, grant, sponsorships, and project funds from these companies are also used to improve the design and appearance of the web sites of the FLAAR Information Network. We thank Canon, ColorSpan, HP, ITNH, and Mimaki for providing wide format printers, inks, and media to the universities where FLAAR does research on wide format digital imaging. We thank Epson America for providing an Epson 7500 printer many years ago, and Parrot Digigraphic for providing three different models of Epson inkjet printers to our facilities on loan at BGSU (5500, 7600, 7800). We thank Mimaki USA for providing a JV4 and then a Mimaki TX-1600s textile printer and Improved Technologies (ITNH) providing their Ixia model of the Iris 3047 giclee printer.

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

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

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

We really liked some of the results whereas some of the other products were a bit disappointing. Providing samples does not influence the evaluations because the evaluators are students, professors, and staff of Bowling Green State University. These personnel are not hired by any inkjet printer company; they are universities employees (as is 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 two manufacturers of piezo printers (Epson and Mimaki). This is because piezo has definite advantage for some applications; thermal printheads have advantages in different applications. Our reviews have universal appeal precisely because we feature all competing printhead technologies. Every printer, RIPs, inks, or media we have reviewed have good points in addition to weaknesses. Both X-Rite and competitor GretagMacbeth provided spectrophotometers. Again, when all sides assist this program there is no incentive to favor one by trashing the other. Printer manufacturer ad campaigns are their own worst enemy. If a printer did not make false and misleading claims, then we would have nothing to fill our reviews with refuting the utter nonsense that is foisted on the buying public.

It is not our fault if some printers are more user friendly, print on more media than other brands. It is not our fault that the competing printers are ink guzzlers, are slow beyond belief, and tend to band or drop out colors all together. We don't need to be paid by the printer companies whose products work so nicely in both our universities on a daily basis. The printers which failed did so in front of our own eyes and in the print shops of people we check with. And actually we do try to find some redeeming feature in the slow, ink gulping brands: they do have a better dithering pattern; they can take thick media that absolutely won't feed through an HP. So we do work hard at finding the beneficial features even of printers are otherwise get the most critique from our readers. Over one million people will read the FLAAR Information Network in the next 12 months; 480,000 people will be exposed to our reports on wide format printers from combined total of our three sites on these themes. You can be assured that we hear plenty of comments from our readers about which printers function, and which printers fail to achieve what their advertising hype so loudly claims.

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

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

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

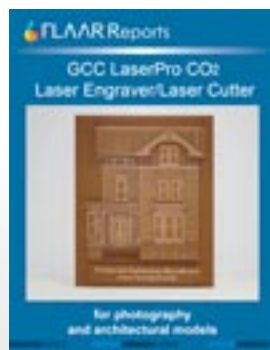
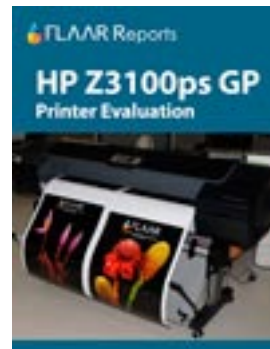
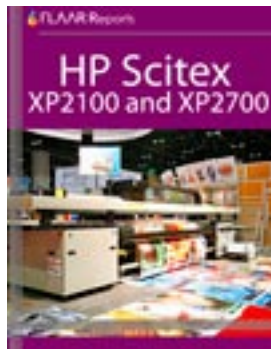
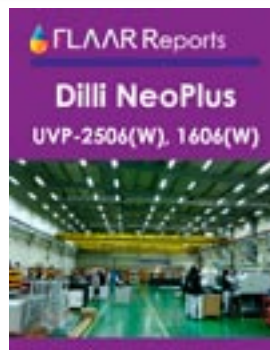
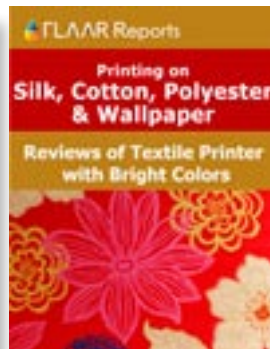
FLAAR also serves as consultants to Fortune 500 companies as well as smaller companies and individuals who seek help on which printers to consider when they need digital imaging hardware and software.

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

Free Samples Publications

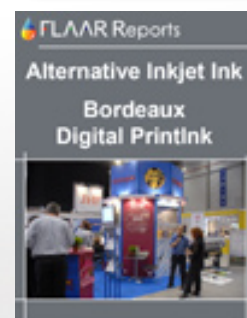
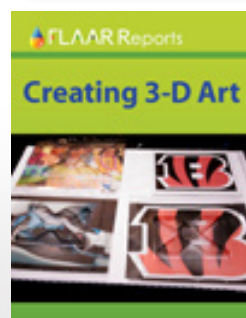
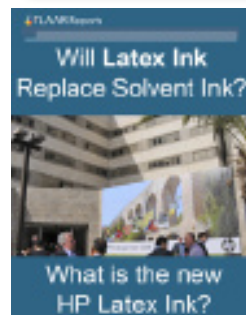
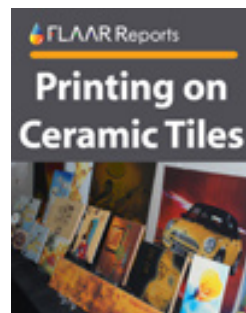
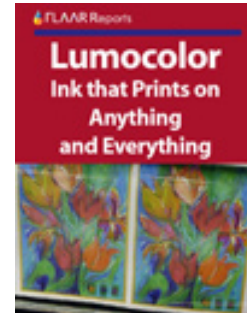
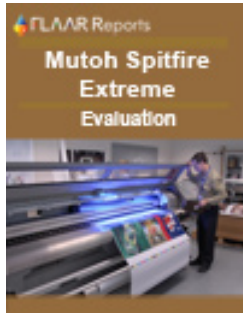
FLAAR Reports

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These FLAAR Reports

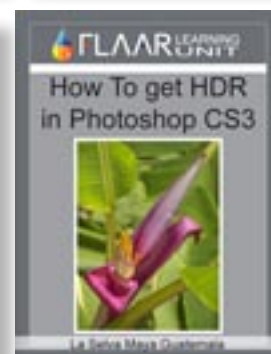
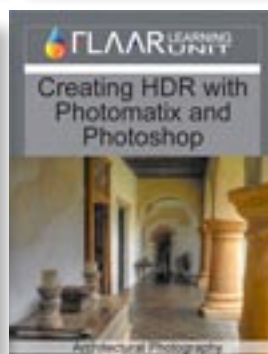
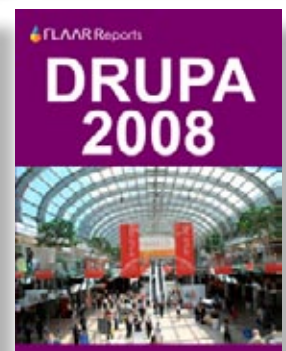
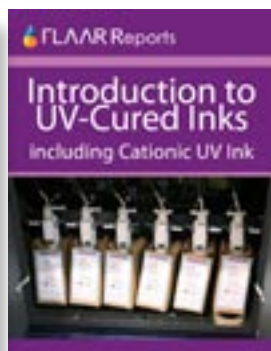
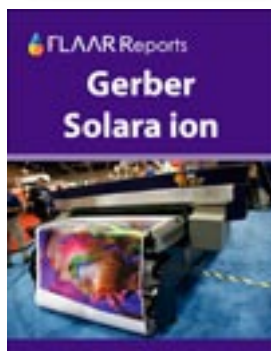
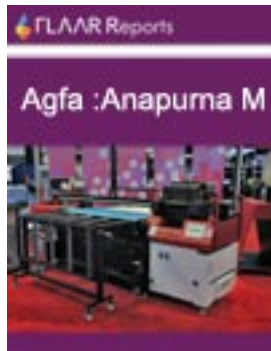
can be obtained at no cost by filling out the Survey-Inquiry Form, which you can find by clicking on the "Access to Survey for Free FLAAR Reports" link on www.wide-format-printers.NET



The advantages of filling out the FLAAR Survey-Inquiry Form are that you can receive multiple benefits: up to six additional different FLAAR Reports (at no cost) but titles you can't download without filling out the request form. Second, you get access to the digital imaging specialists of our partners who can answer your questions in person on the telephone.

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Each month Dr Nicholas Hellmuth travels around the world to investigate and learn more about the new technology.

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You can have more information at ReaderService@FLAAR.org