FLAAR Reports

July 2007

Eco-Solvent Printer Evaluation

Mutoh Rockhopper 3 Extreme

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Mutoh Rockhopper 3 Extreme

THE BASICS

1. Brand name, model?

Mutoh Rockhopper 3, 65
Mutoh Rockhopper 3, 90

So far there are two models, same general chassis, just a different width. I am not yet familiar with any 100-inch version of this model. But the same chassis with a mild-solvent ink (Spitfire Extreme) does have a 100-inch version in addition to a 65" and 90" version also. However the 100-inch version of the Spitfire is structurally distinct to handle the extra weight of rolls of substrates at that size.

2. What is the nature of the company? Is this company the manufacturer, distributor, or rebranding?

Mutoh Europe manufacturers the Rockhopper and Spitfire printers in Oostende, Belgium.

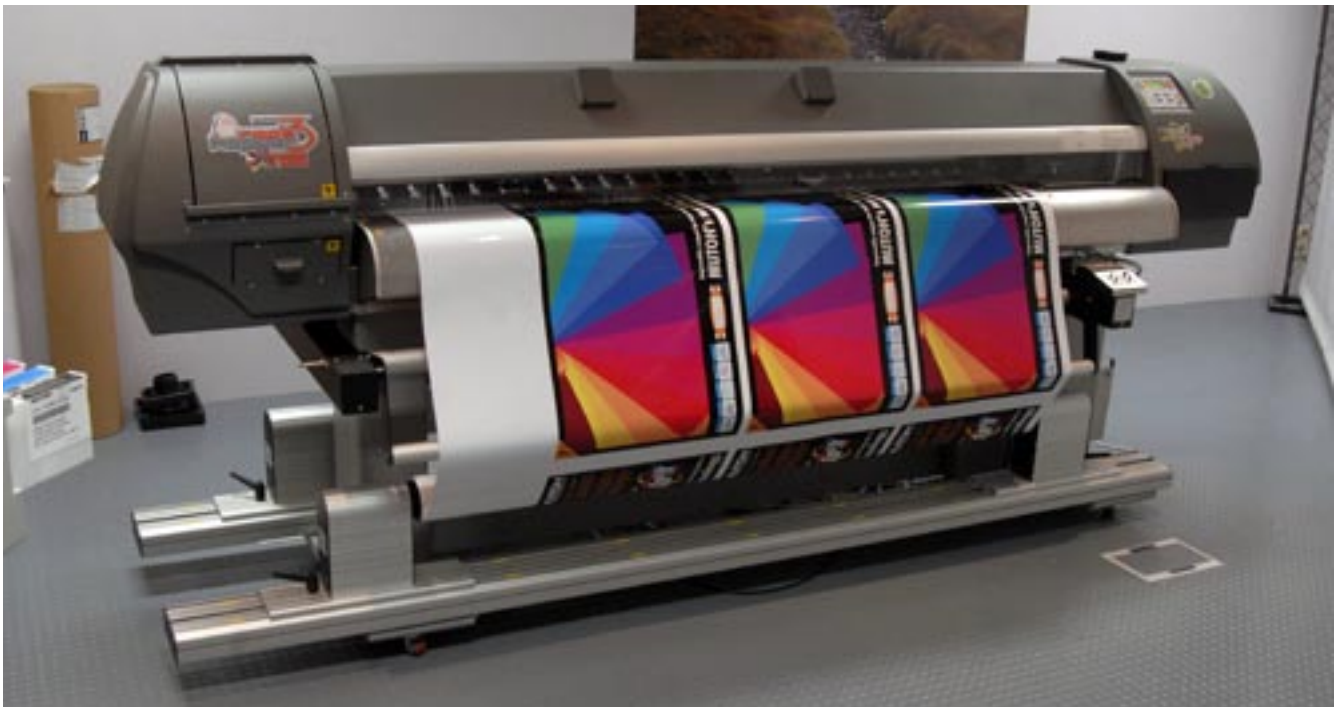
3. What other printers are the same or similar chassis from this manufacturer or distributor? Is this same printer available elsewhere under a different name?

The Spitfire and Rockhopper 3 are the identical print engine and chassis. What differs is the ink: Spitfire uses mild-solvent; the Rockhopper uses a third generation eco-solvent ink.

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

These models are better prepared for solvent inks than previous models; for example, they have four heaters. Earlier and cheaper models, especially of other brands of eco-solvent printers, did not have adequate heating or drying.

The Rockhopper 3 is a substantially more robust chassis and print engine than the entry level Rockhopper 38 and the ValueJet 1204. But there is an appropriate market for every class of printer, from entry level to more sophisticated (such as the Rockhopper 3).



You can field upgrade a Rockhopper 2 to Intelligent Interweaving, but there is no 540 dpi option on the Rockhopper 2. The field upgrade from a Rockhopper 2 also involves replacing and changing to new valves. This is typical of the progress in developing more robust printers to use eco-solvent inks. The first generation (back in 2002) were retrofitted water-based printers because there was not yet enough experience with running any kind of solvent ink through the ink tubes or Epson printheads that had originally been designed only for water-based ink. Now, with several years of experience, all the interior parts are designed to work with both eco-solvent and even with mild-solvent inks. Nonetheless, some internal parts should be replaced every six months by routine maintenance. At least Mutoh is up front about this.

So the Rockhopper 3 has a new third generation eco-solvent ink, new firmware and a more robust ink delivery system to handle solvent inks.

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

These are the original models. There are several rebranded versions: Oce CS9065 and CS9090, Xerox and potentially other companies rebadge the same chassis under different names. Although the Xerox USA web site (as of April 8, 2007) still lacks mention of their own eco-solvent printers (!), the Xerox versions do exist as you can see from the photograph here, from Gulf Print '07 (Dubai, early April 2007). The eco-solvent models are the Xerox 8265 and Xerox 8290.

6. When and where was this model first introduced?

The first showing of the Extreme model in America is at ISA, April 2007.

7. Is this mature, or still in alpha-stage, beta-stage?

This is a mature printer with a mature ink chemistry. All the trial and error took place with the previous two generations of ink chemistry and printers.

8. List price? List price in dollars?

Rockhopper 3, 65" Extreme, with 30 kg winder, 22,790 Euros
Rockhopper 3, 65" Extreme, with 100 kg unwinder/winder, 24,990 Euros
Rockhopper 3, 90" Extreme, with 100 kg unwinder/winder, 33,495 Euros

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

A RIP software is an additional 1000 Euros. You can select from Scanvec Amiable or Onyx. The catalog does not indicate whether these are lite versions or not.

You can opt for an extra memory DIMM for 150 Euros.

An optional infra-red dryer is 1495 for the 65" printer and 2315 Euros for the 90" printer.

The unwinder/winder 100 is 4990 Euros in case it was not ordered with the 65" printer. The heavy duty 100 kg system comes automatically with the 90" model.

Xerox version of a Mutoh Rockhopper, Gulf Print 07

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?

The situation is unclear since the price list for the Rockhopper 3 specifically lists an ink starter kit for 1149 Euros, which suggests that this does not come with the printer unless ordered as an option.

11. Do you eventually need or wish to buy an auxiliary heater?

Most users would not need an auxiliary heater, but one is offered.

12. 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?

The printer creates its own vacuum with fans under the platen, so you do not need an extra outside air pump.

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

There is no spare parts kit in the usual sense of the word, but you do get six months of supplies for cleaning and maintaining the printer. This is included with the original machine at no extra cost.

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

You are not encouraged to make repairs yourself. The dealer is supposed to be called to make repairs.

PURCHASING

15. Are dealers national (most companies) or regional (Roland allows a dealer to operate only within a limited regional area)? Does a buyer have any choice in dealers?

Dealers and distributors vary by country. Only in a larger country do you have a choice in dealers.

STRUCTURE OF THE PRINTER

16. Is this printer made originally as a solvent ink printer, or is it retrofitted with solvent ink? If retrofitted, what was the original brand?

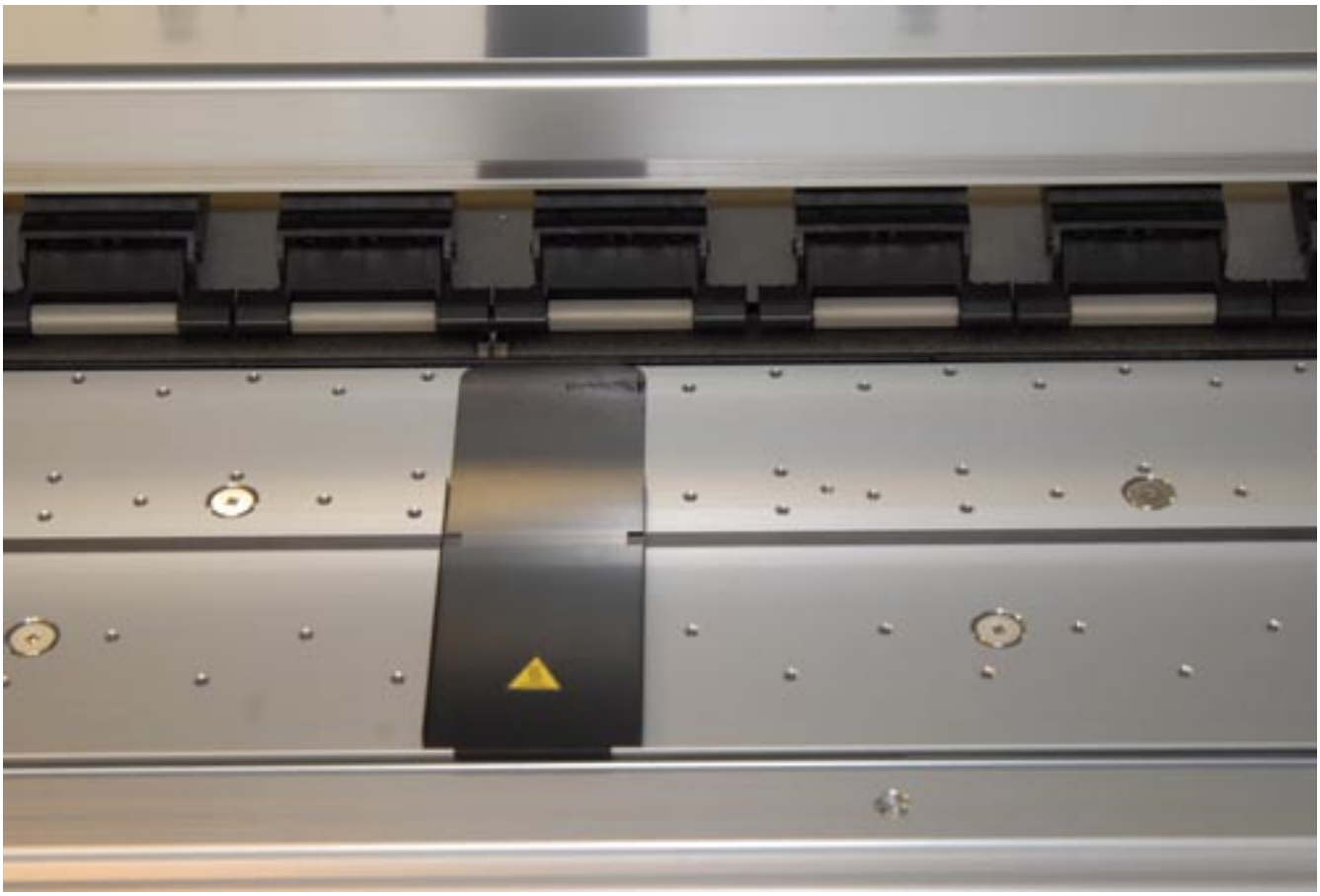
The current version of this printer is made to accept both eco-solvent and even mild-solvent ink. This current version is improved, based on trial and error experience using eco-solvent inks with earlier models.

17. Are their edge guards? At left, or at right, or both?

Yes, there are edge guards at both the left and right.

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

Each edge guard can be moved.



19. Can duplex (double-sided) printing be accomplished? If so, how difficult is it really?

This printer has no special features for double-sided printing.

ROLL-FED

20. How is roll media fed? Pinch roller against grit roller?
Traditional pinch roller against grit roller; the grit roller is what moves the substrate forward.

21. Are the pinch rollers same size as grit rollers, or smaller?
The grit roller is continuous so there is no relevance in its size relative to the pinch roller. In some other systems one of the rollers is not necessarily the identical width of the roller above or below it.

22. Are the grit rollers continuous or individual?
The grit roller is continuous except that since it's the full width of the paper it has to be in several sections. A continuous grit roller insures that every segment of grit roller against which a pinch roller acts is directly parallel.

With Chinese rollers, they are not always neatly inserted so rolling can be out of whack. At Mutoh Europe there is only a one micron tolerance level for the grit rollers. Plus the grit rollers in each printer are from a uniform supply lot.

23. How are the pinch rollers raised?
You can raise the pinch rollers with the remote hand control.

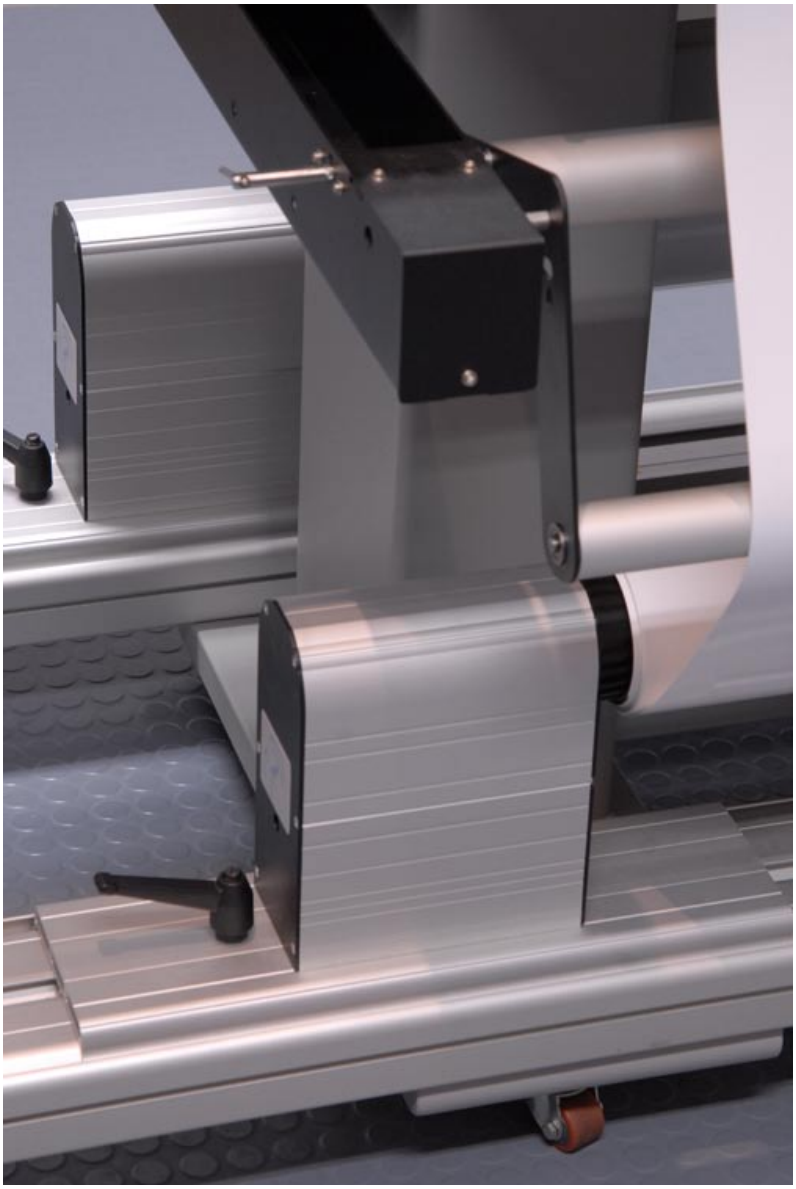
24. Do the pinch rollers leave a path mark on the media? If so, on all media, or only some media?
Yes, occasionally there may be a barely perceptible path mark, but you can't see it unless you really look for it. In some cases this may be the pressure of the pinch roller, in other cases it may be sizing from a cheap roll of media that has come off onto the pinch roller and then is inadvertently transferred to the next roll of media that comes in touch with the pinch roller.

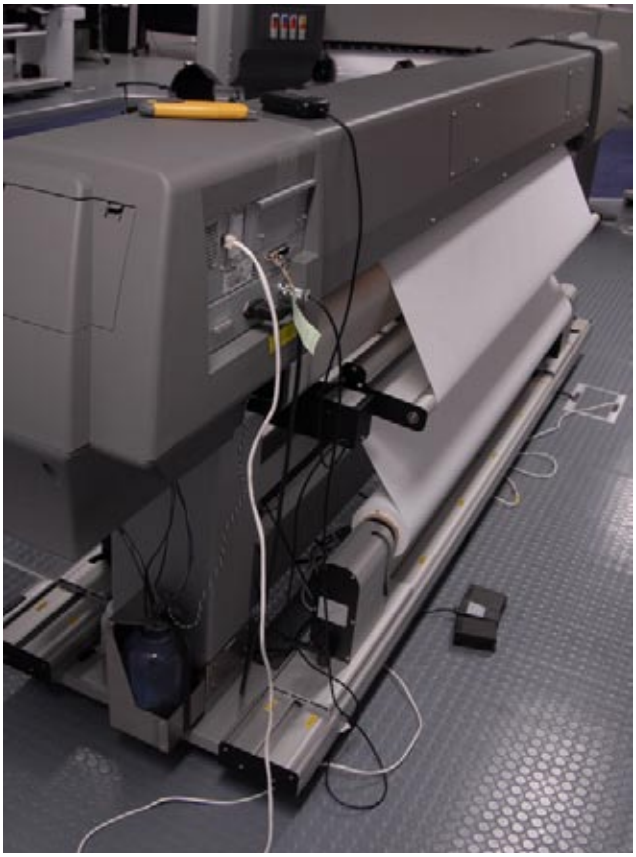
25. How is the roll held at the feeding position? On a spindle? On a saddle?
A spindle is used; you insert it into the cardboard core of the roll of material.

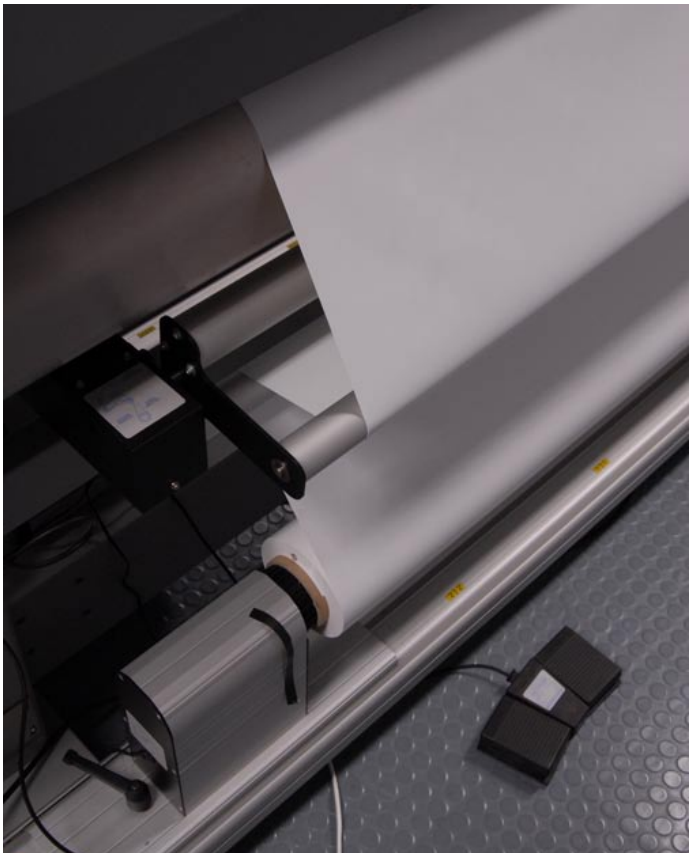
26. How is the roll media handled at feeding position? For example, is there a dancer bar?
Yes, there is a dancer bar; Mutoh calls it a tension bar.

27. How is the roll media handled at take-up position? For example, is there a dancer bar?
There is a dancer bar at both the take-up position and the feeding position. You do not get dancer bars with the HP mild-solvent printers (8000s, 9000s), only one tension bar (which does not dance; it's the dancing aspect that makes the system work best).

28. What about the take-up reel? Does it work unattended?
Once you manually attach the end of the substrate to the take-up reel, it will wind the media up by itself.







HEATERS & DRYER

29. What about heater or dryer? Is there a pre-heater, platen heater and post-heater all three, or just one, or two? How many heaters does this printer have?

There are four heaters, which is a notable advance over inadequate models of other brands that have only two or three heaters.

The Rockhopper 2 had fewer heaters because the structure was not originally designed for heaters (it was a retrofitted water-based printer, as were all eco-solvent printers from Roland and others). It was not until experience was gained that a printer was redesigned from ground up to handle eco-solvent ink: this is now the Rockhopper 3 Extreme.

30. Where are the heaters located? Is heater on top of, or under, the media?

The manuals clearly show the location of the heaters, which are all underneath the substrate area.

31. Can you vary their temperature?

You can vary their temperature individually.

32.What about fans?

There are no fans; fans can potentially blow dust onto the fresh ink.

33. Heat concerns: what heat settings are needed for special substrates?

There are default settings, but otherwise you learn by trial and error which setting works best for which printing modes on which substrates.

OPERATING THE PRINTER

34. 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? Is the printer user-friendly?

I sat down and was easily able to do a print with guidance from a trainer. It looked easy enough that if I had a full training program, that operating the printer would be user-friendly.

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

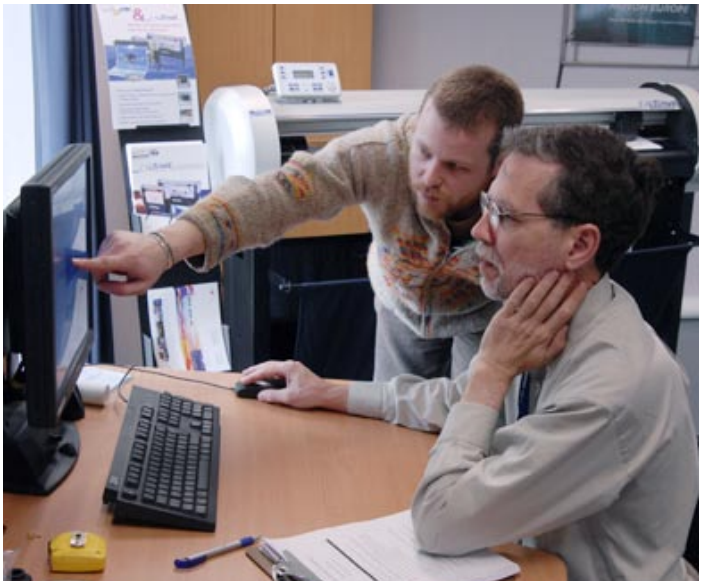
You get a small LCD screen.

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

The LCD screen is fixed, as on all printers of this size and ink type.

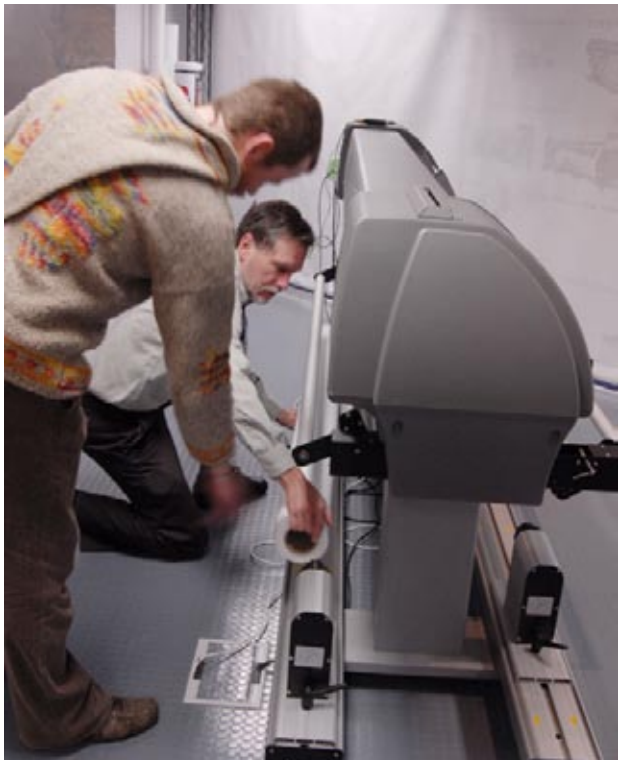
37.How many operators or operator assistants does this printer require?

This printer requires only one person to handle it.



38. Where does the operator stand or sit?

The operating controls are at the front right. The capping station is also at the front right, as is the place to change inks. One cleaning station is at the front left.



Compare the simplicity of the Mutoh with the HP Designjet 9000s, that has four different places for the operator to interact with controls; indeed it has so many places to handle switches that I can't always figure out easily which is the front of the printer and which is the back. I would thus rate the Rockhopper as more user friendly, unless you wish exercise by walking back and forth around your printer.

If the printer requires constant interaction at the back, this requires that you need more working space at the back. Most family owned and franchise printshops don't have this much extra space to allow the luxury of extra work space at the back of each printer.

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

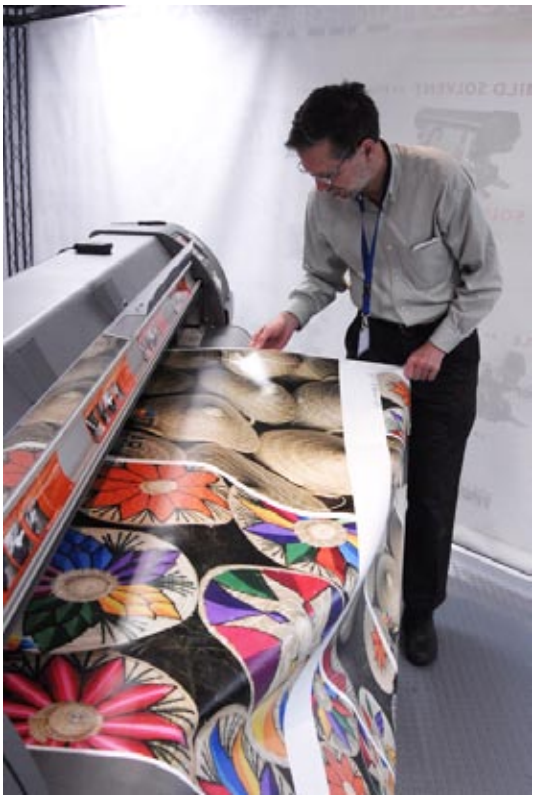
About the only thing you do from the rear of the printer is to load substrates.

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

There are two "remote controls" on wires: a double foot pedal (for forward and backwards) and a hand control for raising and lowering the pinch rollers (so you can feed the substrate into the printer).

I cannot yet find the actual foot pedal shown in the Mutoh manuals; they show only a single-sized one (that looks more like the hand control). And I don't see the hand control itself labeled as such in any illustration of "What's in the Box."

But both of these remote controls exist and are helpful. I can't find any remote controls on any HP Designjet printer. I will check the Mimaki and Roland as soon as one is available. So these controls are a plus for the Mutoh so far.



CONSTRUCTION (BUILD QUALITY)

41. What is the solid-ness of the construction of the outer body? Is it plastic? Metal? Heavy gauge?
The outer body is of adequate strength. The only weak point (in most printers) are the hinges on flaps or covers that open.

42. Describe the overall rail or bridge the structure along which the printhead carriage travels.
When I was inside the factory I noticed that the rails are carefully inspected. In general Mutoh dedicates more resources to inspection of incoming parts than I have seen at other factories.

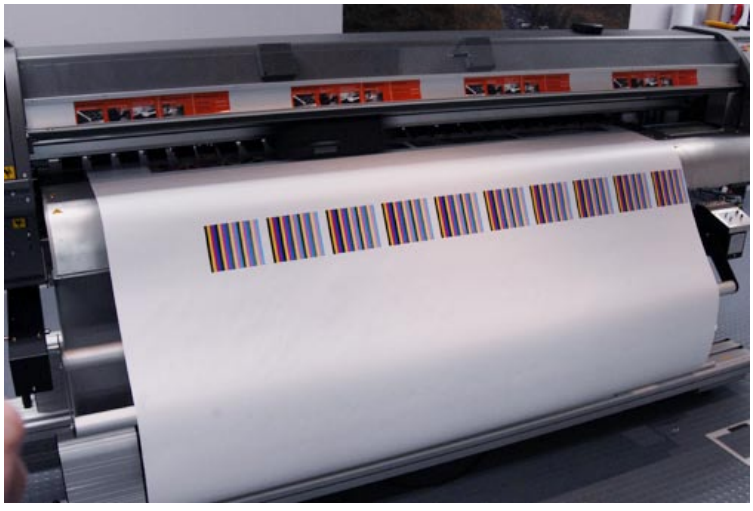
43. Is there both a front hood and a back hood?
There is only a front hood; the back of the printer has no user accessible openings.

44. The hood, is it strong, or cheap plastic?
The hood appears strong enough to hold up okay. It is not as flimsy as some of the newer HP Designjet Z-series hoods.

45. Does the hood have a frame?
No frame needed as the hood is not that large.

46. How would you describe the overall workmanship of visible parts? Clean (Swiss made), or flimsy and uneven (several Chinese-made printers)?
Having spent one entire week at the Mutoh factory, of which three separate visits were made into the assembly line areas, I can state that the workmanship is what you expect in a European factory. The printers are not hobbled together as you see when you look at a Chinese-made printer.

47. Does the printer wobble back and forth when printing?
The printer is more stable than most printers of its size and class.



SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS

48. What is the delivery time, between the time I order the printer and it is delivered?
Delivery time depends on what part of the world you are in, but generally they can be delivered from stock since the Spitfire and Rockhopper share the same chassis and engine.

49. What are the electrical requirements of this printer? This means, will the building have to be rewired.
AC 100-120V/220-240V 60/50Hz.

50. Is the power auto-switching, one or the other, or do you have to switch the power yourself with a manual switch?
The power supply on the Mutoh is auto-sensing (auto-switching), On the HP 8000s and 9000s you have to manually set the power; it is not auto-sensing/auto-switching.

51. Are there any special temperature or humidity requirements or preferences of this printing system?
It is recommended to keep the printer at a temperature of between 18 and 27 degrees C and at 30-65% relative humidity. The manual suggests up to 28 degrees C; the spec sheet 27 degrees.

52. What is the connectivity? Network, SCSI, FireWire, USB 2, or other?
Centronics, IEEE 1284 (Parallel) and Ethernet (network).

53. Is any outside air pressure required to be provided to the printer? Is this for a vacuum table, or other purposes (such as ventilation)?
No outside air pressure is required.

54. How many boxes arrive?
The Operation Instructions are very helpful in indicating that three boxes arrive:
- One with printer body
- One with stand
- One with unwinder/winder 100 system (if that is part of your system).

55. What comes in the box?
- Main unit + motorized unwinding/winding system (Tension Winder 30 or unwinder / winder 100)
- Waste bottle
- Accessory box
- Machine starter set (including ink starter set, User information, CDs, Unit labels & User Maintenance kit)

56. What is the size and weight of the printer
The 65” model weighs 195 kg and is 3.1 x .75 x 1.25 meters in size.
The 90” model weighs 215 kg and is 3.7 b .75 x 1.25 meters in size.

57. Realistically, how much surrounding and support space will the equipment need in addition to the machine's own footprint. What space is needed to accommodate not only the printer but everything else to make the printer fit into your workflow?

The Operation Instructions suggest an area of 12.7 m2 (144 ft2) with a frontage of 4.7 meters (15.7 ft) for the 65" model and 14.3m2 (162 ft2) with a frontage of 5.3 meters (17.7 ft), or more.

INSTALLATION OF THE PRINTER

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

Usually you only get a site prep guide for UV-curable flatbed printers or for grand format solvent printers. A site prep guide is not expected for a basic 65" eco-solvent printer.

59. What is the rating of the usefulness of the Setup Instructions?

Setup instructions, at least in the short Operation Instructions, look adequate.

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

The manual for the Spitfire is called User's Guide and is 176 pages long. The only manual for the Rockhopper 3 Extreme that I could download is called Operation Instructions and is 64 pages long. But in the Rockhopper Instructions it states that you receive a

- User's Guide,
- Quick Installation Guide + CD, (contains User's guides and operation instructions of all Mutoh machines)
- Instruction sheet starter kit,
- Getting Stated with Mutoh's 1-in-All.

So far we are missing all the above (we have only the Operation Instructions so far, since this short version of the User's Guide is the only one I noticed on the Mutoh Europe web site that could be downloaded). I do not yet understand why there are two sets of operation instructions and why only one is downloadable.

If you compare manuals of other manufacturers: HP has the best. Mimaki are okay but minimalistic. Canon manuals are most politely described as so complex that they are not really functional (they are web-based, not a traditional manual, and thus not user-friendly).

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

The English is perfect.

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

Basic frontal elevation drawings are provided (3D views) but no exploded views or useful details (the kind of drawings that Canon makes readily available for their cameras, and on their new printheads). Exploded views are only delivered at Mutoh authorised resellers. Not included in manuals for end-users.

63. What is setup of the printer like? How many people are required to be provided by the end-user to help for setup?

The manual says that "have four or more people to unpack and assemble the printer" but that "have two or more people to transport the printer." Thus I can't figure out why you need four people if only two are required to "transport" the printer. Mutoh explains that it takes four to unpack, to lift the printer body onto the stand. (taking care of your back) For transport 2 is enough as the unit remains onto the stand and the unit can be pushed (wheels).

TRAINING

64. Is training necessary? Is classroom training available?
You get training while the printer is installed. There is no classroom training in a formal sense.

65. Is factory training available?
It is not normal to ask for factory training with this printer.

66. What on-line training is available?
No on-line training is available.

67. Between the day the printer arrives, how soon is it realistic to achieve full productivity?
I spent some time doing a test print and found the ease of use nice and simple. Obviously in a demo room visit you don't have to achieve real life productivity, but I can envision that within the first or second week you should be doing regular production.

68. How much of a learning curve is there?
The main learning curve is more likely how different substrates react and what modes work best, what heater temperatures, etc. The printer itself is fairly straightforward.

TECH SUPPORT & WARRANTY

69. What is the original warranty period?
Everything is covered for one year.

70. Does it include parts, labor, printheads?
The printheads for eco-solvent ink are warrantied for one year; the same printheads for mild-solvent ink (Spitfire) are covered only for six months.

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

72. Does the dealer or manufacturer provide the service?
The dealer rather than the manufacturer provides service.

PRINTHEAD TECHNOLOGY

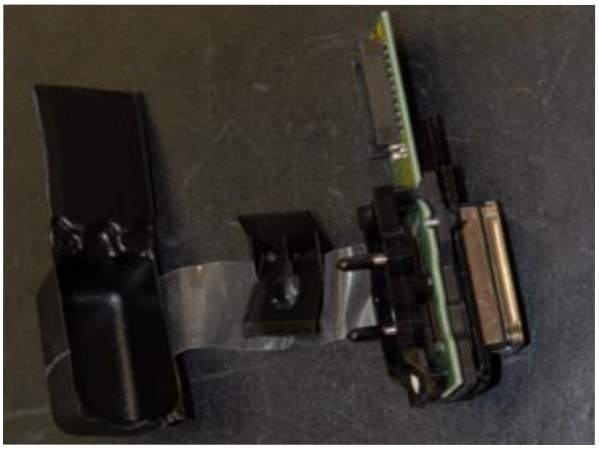
73. What printheads are used? Xaar, Spectra, Epson, Konica, Seiko or other?
The printheads are from Epson.

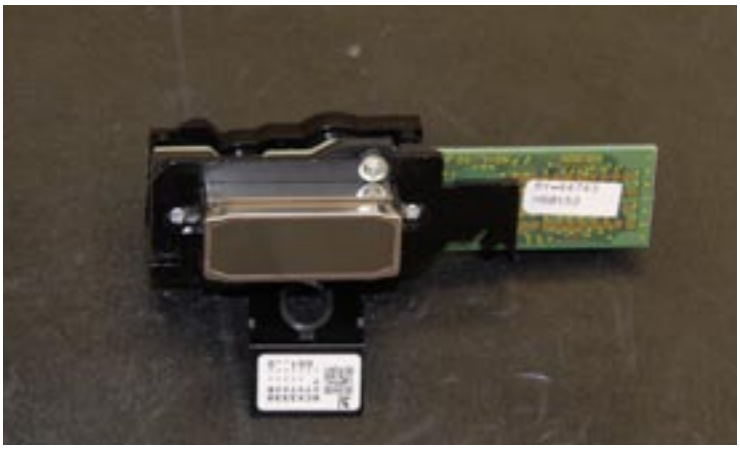
74. What model of the printhead is used?
This printer is stated to use an Epson i663v head based on the Epson 160B head. There is not one single response from Google for an i663v printhead.

75. Is the printhead identified in the spec sheet brochure by brand or also by model, or not at all?
Nowhere in the official literature does Epson allow Mutoh to mention that an Epson printhead is used. This is silly of Epson, as though they are embarrassed. If it's a good printhead, everyone should be proud to list both the brand name and the model and the specifics.

Spectra proudly lists when its printheads are in a printer.

76. Explain the pros and cons of Xaar, Spectra, Epson, Konica, Seiko or other heads relative to their ability to handle solvent inks. If Xaar heads define how long they last compared with Epson or Spectra heads.
The pros and cons are endless, but put simply, Epson printheads were originally made for water-based ink only, and to handle solvents companies such as Xaar, Spectra, Ricoh etc make more industrial printheads.





77. How many other printers utilize the same printhead? Have they shown any problems?
Roland and Mimaki use essentially the same Epson printheads. Epson will be launching a new solvent printer during late 2007. This at least will provide more incentive for Epson to develop a printhead that is more attuned to handling solvents. Of course the question is whether they will share such a new printhead with Mutoh and others.

78. Can a sensor(s) detect clogged nozzles and can software provide backup nozzles to cover that missing area on the next pass?
Epson printheads lack backup nozzles.

PRINTHEAD Positioning

79. Are printheads arranged in a cluster, or in an array?
There is no array.

80. Are printheads in a single row, or staggered?
The printheads are in a single row.

PRINTHEAD DPI & Print Quality

81. What is the drop size in picoliters?
The Mutoh spec sheet lists the drop size as between 5.4 ng and 41.5 ng, rather than in picoleters that photographers are more familiar with.

82. Is there variable droplet capability?
Yes, there is variable droplet capability. When you go to the Oce web site, you see the droplet sizes in picoliter measurement: 5, 11, and 22 picoleters. Oce suggests that by using 4 colors instead of 6 colors (4 colors with variable droplet sizes) you can save on ink.

83. How many nozzles per printhead?
There are 180 nozzles per row; two rows per printhead for a total of 360 nozzles.

84. 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?
Specs for the ValueJet state it has a "1440 dpi piezo print head." If this is the true dpi, I would like to see a detailed drawing of the head; the kind Canon so capably provides of its impressive printheads. I am not convinced that any Epson printhead is over 360 dpi, but since new heads do come out, I will revise this statement when adequate evidence is presented: see the next paragraph for clarification on true dpi vs dpi achieved via software or multiple passes.

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

The actual dpi of Epson printheads circa 2006 is 360, not 1440. 1440 can be achieved by multiple passes; quality can be greatly improved by software (such as Intelligent Interweaving), but it is not appropriate to list the dpi as anything over 360 without qualifying it.

86. How many print modes are offered?

Print modes with a Mutoh are different than with other printers because the Spitfire and Rockhopper 3 have the advantage of a unique Intelligent Interweaving technology.

87. How many passes can this printer achieve?

Mutoh brochures count a full back-and-forth as one pass. FLAAR counts this as two passes. Either counting system is okay as long as it is clarified up front, and as long as you realize that the norm is that a single movement of the printhead in one directly is traditionally a single pass. So a single back-and-forth is two passes.

Since the Rockhopper 3 offers Intelligent Interweaving, you don't have to slow it down to 32 passes (like the Roland, which lacks Intelligent Interweaving). This technology is described in a separate report.

88. How does this company describe photo-realistic? Air-brush photos from a LAC printer are not photo-realistic.

Everyone describes photo-realistic in a different way. To me a print is only photo-realistic if it is acceptable for a public exhibit of fine art photography. Although I would tend to ask for an Epson, Canon iPF or HP Z3100 system to print any exhibit, I found the image quality of the Rockhopper sufficiently acceptable that I did several exhibit quality prints easily.

89. Is the sequence of ink color laydown the same coming and going? (rare). Or is the sequence of colors bi-directionally a different sequence than uni-directional? (the usual way).

If the printer is loaded with dual CMYK inks, then they are in mirror position so print coming and going in the same color sequence. This is not possible if you have the system loaded with six colors.

90. Do you print bi-directional or uni-directional?

You can opt for bi- or uni-directional printing.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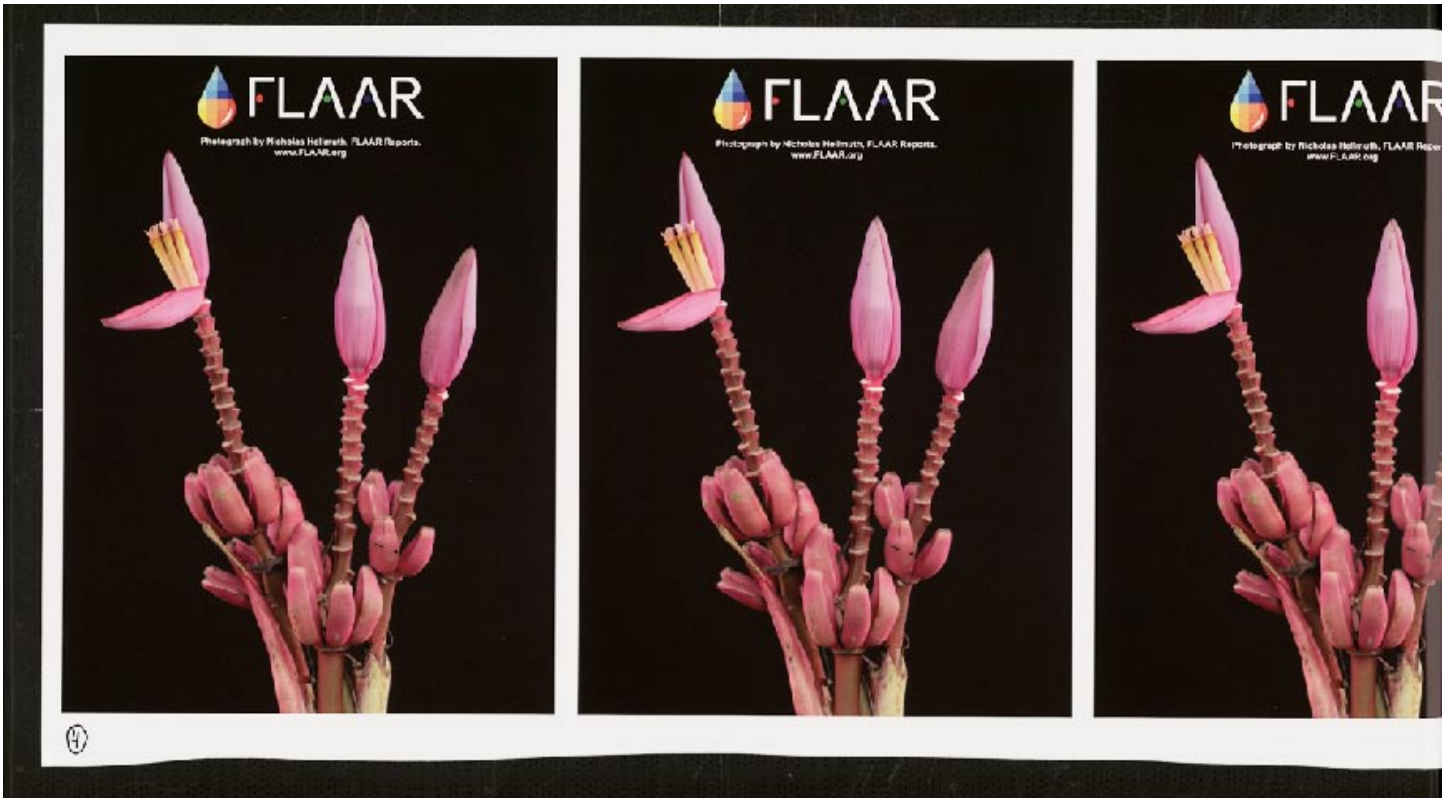
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BANDING ISSUES

91. Is there banding in areas of solid black?

It is natural to have banding in areas of solid black, and indeed in most areas of solid dark colors. But if you clean the printheads (purge them), if you dial in the correct media feed number, and if you add Intelligent Interweaving technology (available only from Mutoh) then you can achieve prints of solid black that look gorgeous.

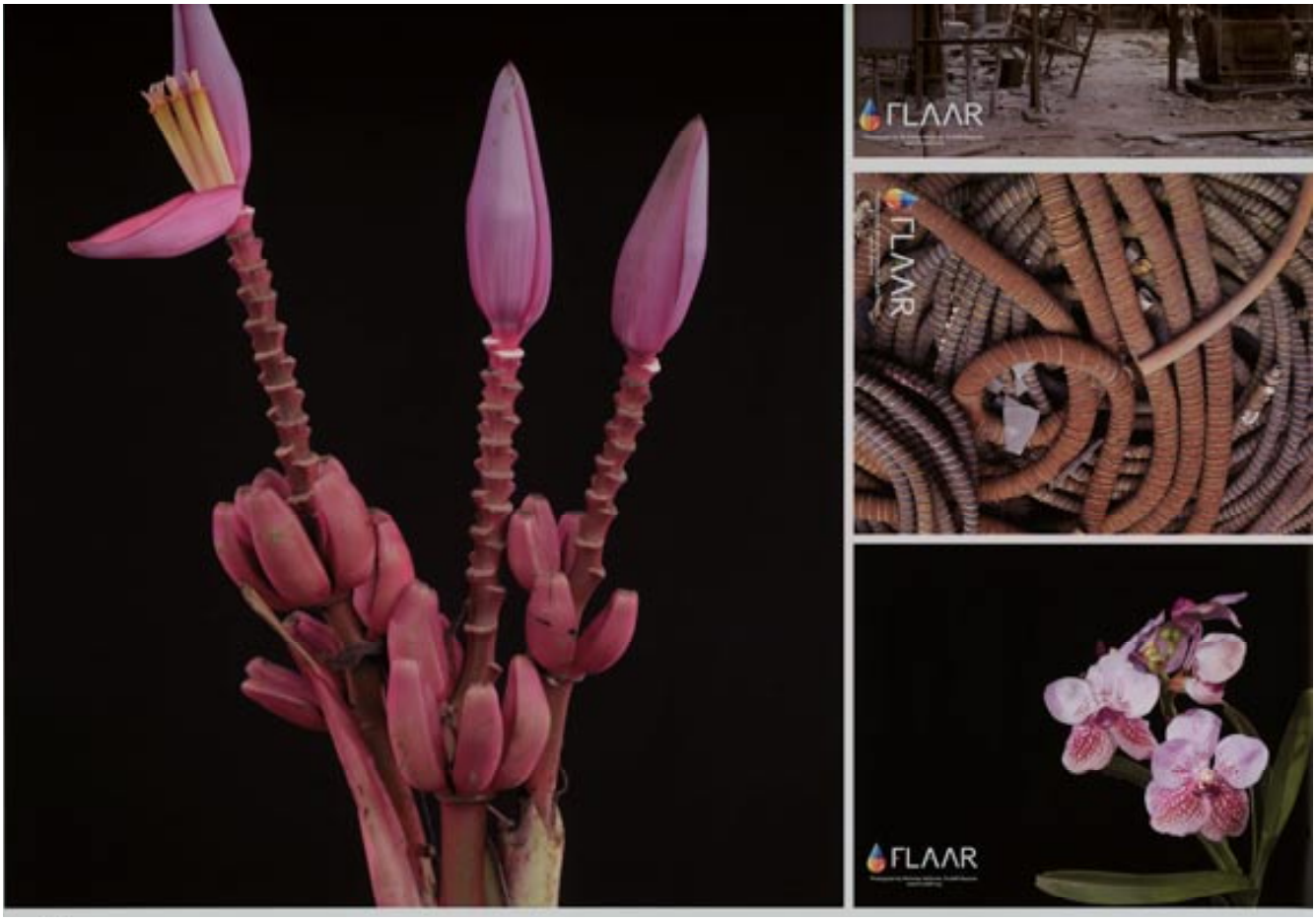
PRINTHEAD LIFE EXPECTANCY

92. How long do your printheads really last? Do you have that written in a warranty? If your longevity specs are in drops, please translate that into liters of ink or square footage of media.

The printhead is warrantied 28 x 10 to the 9th droplets per nozzle, or one year (whichever comes first). It would be much easier Epson would simply admit that their printheads wear out after so-many liters of ink.

93. How can head strikes be avoided?

One way to avoid head strikes is to use edge guards. The MimakiJV5 has an even more clever head strike avoidance system: a bumper in front of its carriage. If the bumper finds any raised area of the media, it stops the carriage before the printhead nozzle plate can even come close to the danger.



Rockhopper sample

CLEANING & MAINTENANCE NEEDS

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

The cleaning area is at the left. It has a mirror so you can more easily see the condition of the heads.

95. How is head cleaning accomplished? Spray, vacuum, manual, other?

There are three levels of head cleaning:

- Small
- Normal
- Strong

96. Is there a capping station?
Yes, there is a capping station at the right.

97. Where is the service area? At the left, or at the right?
The service station is at the left.

98. Is there a dip-station that is separate from the parking or maintenance station? Is there an off-printer dip or soaking station for the printheads?
There is no ultra-sound off-printer soaking station to clean stubborn printheads. You only tend to get this kind of off-printer option when you have an industrial-strength head such as by Xaar or Spectra.

99. Is a liquid flush cleaning solvent available as a separate on-board system? Do you have to manually open and close a valve to let solution flow through a printhead? Is it individual for each printhead?
There is no on-board cleaning solution; you apply the cleaning liquid manually to the capping station caps, with a pipette.

100. Upon start up in the morning, do you have to swab the heads? How long does this take? How messy is it?
Since this is eco-solvent, and no mild-or full solvent, you don't have to constantly clean and purge. Cleaning around the caps and around the heads is only weekly, not daily.

101.What cleaning materials are recommended? What is not recommended?
You receive a full six months cleaning and maintenance kit with the printer when you buy it.

102. What maintenance is needed at the end of the production day (usually before night)?
Since this is eco-solvent ink, you do not have to purge, flush, or fill with cleaning liquid every night (or any night).

103. What daily maintenance is required if you print the entire day long?
There is no required daily maintenance; only weekly maintenance.

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

Once a week

- Clean around the edges of the caps
- Clean around the heads (but do not wipe an Epson nozzle plate directly)

Once every two weeks

- Clean the wipers

Once a month

- Replace the wipers
- Replace the sponge in the spitting box.
- Clean the upper sponge in the capping station.

Every six months

- Clean the upper sponge in the capping station.

105. How often should a licensed service technician come and service the printer?

Every six months a Mutoh technician should service the printer.

SAFETY CONCERNS

106. Are emergency buttons present, and if so how many, and where are they situated?

Most eco-solvent printers from 44 to 104 inches do not tend to have an emergency shut down button anywhere.

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

The printer shuts down by itself if you open the hood.

108. How much odor is emitted by the ink?

The MSDS sheet, in the section on Toxicology and health hazards, suggests that you do not want to systematically inhale the vapors from this or any solvent ink.

109. How much subsequent outgassing is there, and for how long does the stuff smell?

The outgassing is mainly from the freshly printed material. The ventilation system, including the add-on ventilation, do not capture or purify any of this outgassing. You would need a front-skirt (front shield enclosure) and also a room air purifier. The latter is made by ICA; front shields are made by PAT. You need them both if you wish to have a more realistically clean workroom environment.

But eco-solvent ink is definitely not as irritating or aggressive as other kinds of solvent ink.
I did a sniff test about 5 hours after printing. The media had an odor but not the ink.

110. Is the machine enclosed, or exposed?

The printer is enclosed. The only solvent printer I know that is exposed is the ColorSpan 72S.

111. What system of ventilation or exhaust system is built into the printer?

There are vent openings built into the printer.

112. Even if not required, what would common sense dictate? Is it adequate to clear the work area of gasses and fumes?

In theory eco-solvent ink does not legally require ventilation. But in reality, some people are sensitive even to eco-solvent fumes. So it is advisable to vent any room that has any kind of eco-solvent ink.

FLAAR also recommends a room air purifier such as from Island Clean Air.

There is a difference between what the law or regulations require (which for this ink is essentially nothing) and what common sense should dictate. Common sense should make it clear that air purification and ventilation are advisable (even if not required by law)



113. What is the noise level?

54 dB.

114. Do the printer specs list the noise level?

Yes, Mutoh is open about specs, more so that competing printer manufacturers.

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

All operators and shop managers should be concerned with safety in general.

116. Is the Operator Manual so poorly translated that you might make a mistake; a mistake that could be damaging to your health, or otherwise dangerous for your printshop?

The manuals are in fully understandable English.

117. How easy is it to access 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.

Mutoh immediately gave me a hard copy print-out of their MSDS of the eco-solvent ink when I asked for it. I have tried to get MSDS sheets from competing brands: Mimaki provided theirs; one other manufacturer did not cooperate (which violates federal law).

One place to obtain MSDS sheets from Mutoh is on http://mutoh.com/supplies/MSDS.html. However I did not see their mild-solvent ink here. Mutoh states that with every ink cassette or ink bottle shipped from Mutoh an MSDS sheet is included.

INKS

118. How many kinds of ink are available?

You can select between mild-solvent and eco-solvent ink. If you begin with eco-solvent you can subsequently upgrade to mild-solvent if necessary (but it is not realistic to switch back and forth constantly).
If you select eco-solvent ink your printer has a label as Rockhopper 3 Extreme. If you select mild-solvent ink your printer is designated as a Spitfire Extreme.

119. Is this a full-solvent, mild or lite-solvent or eco-solvent?

This is a third generation eco-solvent ink and is chemically distinct from mild-solvent ink (which is stronger and requires more cleaning).

120. Does the manufacturer provide a glossary to help you understand what ink(s) they offer?
No glossary. Few manuals have a glossary, though I did notice that the manual for the new HP Z3100 has a glossary (necessary to help the user understand color management).

121. What is the chemical composition of the ink?
You can obtain the MSDS of the ink and learn about its chemical composition in this manner. The head ink chemist at Mutoh Europe patiently explained the differences to me between mild-solvent and eco-solvent inks. Eco-solvent is based primarily on glycol ether (Diethylene glycol diethyl ether, up to 65% by weight).

122. What kind of ink is this? Compare it with the ink for other printers, what are similarities and differences?
This is a third generation eco-solvent ink, essentially the identical ink used by Roland. That's because Epson requires any printer with its Epson printheads to use an ink provided through Epson. This is the "ink tithe" system that causes ink prices to be so high (and thus causes people to try to use after-market inks).

123. What is shelf life of the ink (CMYK)?
Shelf life is 2 years.

124. What company makes the inks? Choices include DuPont, Sericol, Sun, Triangle, KonicaMinolta, Tetenal, Toyo, and several others.
Epson and Mutoh decline to mention whatsoever where the ink actually comes from. This is typical of all printer manufacturers: none disclose where their ink comes from. Only when you move into UV-curing inks do the manufacturers state where the ink comes from (or at least don't block reasonable attempts to learn where the ink is really made). Epson itself does not make ink.

125. How many colors?
You can select a dual CMYK system or a basic 6-color system: CMYK plus light Cyan and light Magenta.

126. Is white ink available? What is the shelf life? Does the white ink need special attention? (Titanium dioxide may settle out if it sits too long). What company provides the white ink?
No white ink is available.

127. Other than white, how many spot colors are available? What about metallic colors?
No spot colors are available.

INK Cost

128. Does ink come in cartridges or bulk?
Ink comes in 220 and 440 ml cartridges, the same kind of cartridges that you get with any printer using Epson printheads. At least they don't try to use the mini-110 ml size.

129. Is there a bulk ink system? Is it from the manufacturer, OEM or third-party?
The bulk ink system that is available for the Spitfire's mild-solvent inks is not available for the eco-solvent Rockhopper 3

130. How do you add the new ink?
You take the old cartridge out and slide the new cartridge in.

131. Where do you add the ink? Front or back of the printer?
You add the ink conveniently at the right front of the printer. You don't have to go around the back.

132. What kind of protective devices are on the ink system to keep you from using after-market ink?
All printers that use Epson use chips on the ink to try to prevent you from using after-market ink.

133. Is a liquid flush cleaning solvent available as a separate on-board system? Or do you apply it manually with a wipe-cloth? Or dip the heads in the solution?
There is no on-board flush system. When and if you might have to flush out the ink you have to remove the ink cartridges and insert a separate and relatively expensive flush solution. Then you have to flush out the solvent rinse before installing ink back again to restart the printer.

134. How often does the waste container need to be emptied?
When you are installing the printer for the first time the waste container will fill up with the cleaning/flush solution. So during installation you need to empty the waste ink tank (twice actually). The LCD monitor will have messages to this effect.

Later on, during normal usage, the LCD will display a Waste Ink Tank message, suggesting that now is time to empty the waste bottle.

135. Where is the ink waste container? Is there one, or two?
There is one waste container. It is open to view and neatly situated to the right of the main support at the right.

INK Color Gamut

136. What colors can you achieve easily and nicely?
I am completely satisfied with all the test prints that the Mutoh Rockhopper 3 Extreme undertook. I am very picky and hard to please when it comes to the color of my fine art photos. The photos of the heliconia and ginger flowers are color balanced in PhaseOne software, so I demand that a printer be able to handle this. The Mutoh did perfectly (frankly better than I expected).

INK: Miscellaneous

137. What about ink drying time?

The ink is dry to the touch when it comes out of the printer, but needs significant drying time before you can laminate it. You also ought to wait a few hours before you cut the material. While the ink is still "wet" it can also abrade easily. But once the ink is totally dry, it is relatively resistant to moderate abrasion.
These drying issues are no different than with other inks and other printers. The only difference is that Mutoh is honest and tells you this up front.

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

No, you do not need a band of printable colors to keep each ink channel open.

On the HP 8000s and 9000s, both require (or highly recommend) adding a band of printable colors. This uses up media, print time, and ink.

INK: Appearance

139. Is output splotchy?

At high speeds you can probably create mottle (the unsightly patchy manner the ink concentrates itself on the surface). But at good production speeds and with Intelligent Interweaving turned on, I did not notice significant mottle at all. You mainly see mottle with Chinese and some Korean printers, especially those that use Xaar printheads.

INK: Longevity

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

Ink longevity is rated as three years outdoors, but this is for northern Europe, not for Florida, New Mexico, or California sun.

141. 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
- 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

142. Is lamination required, and if so, when?

Mutoh is correct to state clearly, in the main brochure (and not hidden in some obscure manual) that “for fleet, floor graphics or other applications where prints are exposed to intensive mechanical stress or abrasion, lamination is required.”

You also need to realize that in northern Europe the sun does not shine that much (it usually is overcast or it rains). So if you live in Greece, Dubai, Florida, or most of Latin America, realize that the sun and rain in your area may not allow a 3-year longevity outside without lamination.

143. How long should the substrate dry before you laminate it?

It is recommended to have the material dry at least 24 hours; the actual time also depends on the material and on the ink load.

SUBSTRATES

144. What sizes of material can be printed on?

The 65” model can accept media 1.651 meters wide and can print on 1.641 m of this. The 90” model can accept media 2.28 meters wide and can print on 2.24 m of this.

145. Is width enough for target applications?

If you are printing 100” wide it is assumed you will tend to use a mild-solvent or full-solvent ink, so the eco-solvent version offers only 65” and 90’ widths.

146. What is print width relative to roll width? Can you do borderless printing?

No borderless printing with most sign printers; it is assumed you will have a trimmer.

147. What core diameter(s) will this printer accept?

Both 2” and 3” cores.

148. How about maximum roll diameter or weight?
Maximum diameter is 30 cm, and weighing 100 kg.

149. Front loading, back loading?
The printer loads at the back. I have practiced loading the printer; it is easy to learn.

150. What is the paper path?
The paper path is not complex. You can see the paper path in our photos, or you can look at the line drawings in the Mutoh manuals.

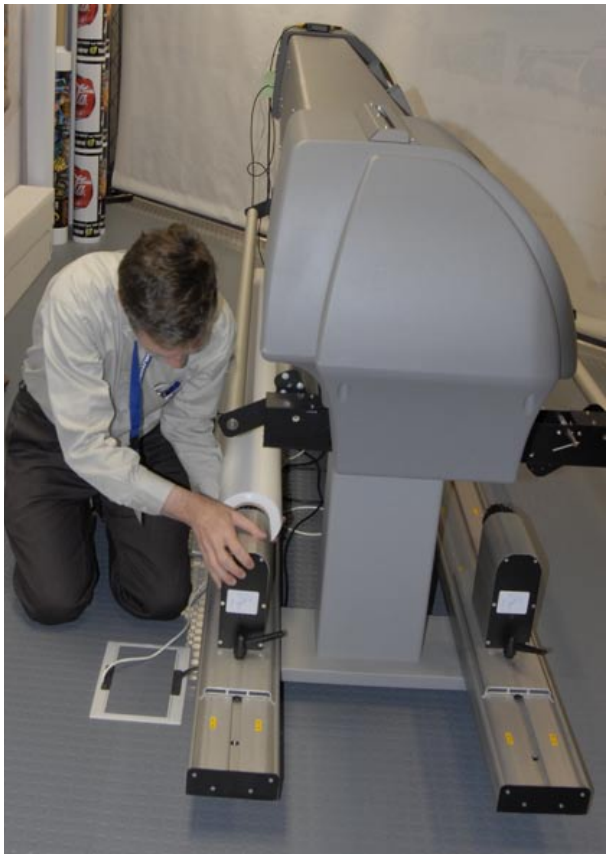
151. Can you adjust the rate of media feed?
Yes, you can dial in a media feed adjustment and print a test pattern to make sure the banding has been dialed out.

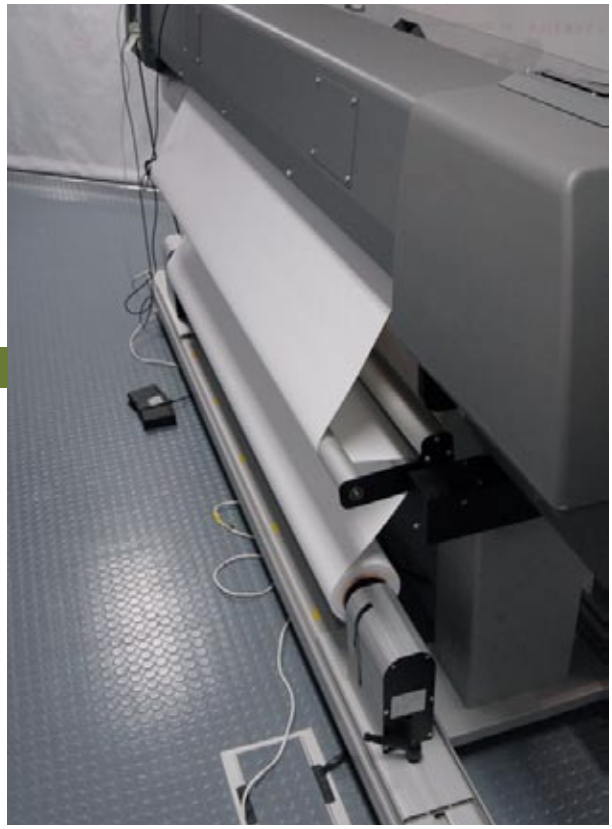
152. What thickness can this printer handle?
.08 to 1.1 mm material thickness.

153. Is there a reliable counter of media length remaining?
Yes, there are five counters in the machine, but if you exchange rolls you must write down somewhere what the number is, and then re-insert this count when you re-install that roll.

154. Is there manual feed capability of sheets (sheet feed)?
Yes, you can manually feed individual sheets.

155. Does media skew when it is wound up?
I have not yet heard of this issue with Mutoh printers.





SUBSTRATES: Issues

156. What materials does the manufacturer recommend to use this printer for?
Mutoh indicates you can print on uncoated SA-PVC and on uncoated banner material. Then they also indicate the considerably larger portfolio of coated materials that work even better with eco-solvent ink.

157. What is the realistic media compatibility?
In order to learn the reality of (coated) media and (uncoated) substrate compatibility, you need to find and ask a printshop that has used a printer for more than several months.

158. What kinds of substrates will not work with this kind of solvent ink?

Coated media for water-based inks is not recommended. Some PVC won't work either, but usually another PVC from the same brand will usually work.

In other words, yes, you can use uncoated substrates, but by no means all of them

SUBSTRATES: Image Quality

159. Do you get roller marks on some media? Which media? How bad are the marks?

Yes, you occasionally get pinch roller marks, on some thick material such as banner, after it has been heated.
But the main form of pinch roller marks are when the sizing or other aspects of coating of a media gets onto the pinch rollers and subsequently transfers to the next media that is run through the rollers. So you may occasionally need to clean the pinch rollers (by wiggling the media under them or otherwise by innovative common sense methods).

160. Is backlit saturated enough with one print, or do you have to print two and mount them together?

There is a backlit mode that provides double-strike printing, but this slows down the speed. Usually you can do acceptable backlit without double-strike mode. This will depend on your client's needs and expectations.

161. How much acclimatization time is needed for the media?

Follow instructions of the manufacturer. 24 hours is best, but at least 30 minutes is helpful if that is all the time that is available. It is always better to store media in the same room that you will be using it in.

WHAT IS THE INTENDED MARKET FOR THIS PRINTER?

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

Anyone who currently owns an HP 5000, HP 5500, Encad, or entry-level solvent printer (any brand) would be a potential customer for the Mutoh Rockhopper 3 Extreme.

The print quality of the Rockhopper 3 Extreme today is frankly essentially as good as the HP Designjet water-based inks. I was very impressed (and frankly surprised) by the output of the Mutoh Rockhopper 3 Extreme and Mutoh Spitfire Extreme. Plus the Intelligent Interweaving technology makes this production at an acceptable speed.

The Rockhopper 3 Extreme is specifically made for sign shops that have low to medium production volume: in other words they are printing signs, but not in two shifts a day. If a print company is printing all day long (even if only one shift, but every day all week) then they should consider mild-solvent ink and the Spitfire Extreme version of the Mutoh. The Spitfire Extreme is the identical chassis and print engine, just a different ink.

163. What markets that printshops aim for might be prospective buyers of this printer?

If your clients expect their signs and banners to be free of banding defects and mottle (free from splotchy patches), then you definitely need a Rockhopper 3 Extreme or Spitfire Extreme as opposed to a cheap Chinese printer that has banding and splotchy output.

APPLICATIONS: What Questions should the printshop owner ask of himself?

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

Yes, you can print soft signage, but best on material with a tight weave, such as from 3P. Another good fabric is SEEMEE from Verseidag Indutex.

165. What other kinds of applications can you print?

- Billboards (good on most materials, because viewing distance is far)
- Banners, general signage (good on most materials)
- Exhibit graphics;
- Backlit;
- POP;
- Bus shelters

Image Quality Issues Relative to Applications

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

You can read text down to 3 pt type.

RIP SOFTWARE

167. Is a RIP included?

You can add a RIP for 1000 Euros (circa $1,300) which is less than the price for most lite-RIP software if purchased separately.

168. Is a computer and monitor included (to run the RIP)?

You have to buy your own computer and monitor to run the RIP software.

169. Is this RIP fine tuned for this printer in particular?

Yes, to some degree. The RIP software engineers must visit Mutoh Europe and work directly with the printer and its designers.

170. Is the driver just for PC? What about using this printer with a Mac?

Mutoh does not provide a driver because a sophisticated sign printer needs a real RIP.

171. How many other RIPs work with this model of printer?

Officially Mutoh lists three RIPs: Onyx, SA International (formerly ScanvecAmiable) and EasySIGN. But for the test prints I used the Caldera RIP. It was easier to use than I had expected, but was not set for RIP-while-printing, so you have to wait several minutes for the file to be RIPed before it starts to print; it was five to seven minutes for a medium sized print. I would tend to recommend the other setting so the software RIPs while it prints: it RIPs one line, prints that line while RIPing the second line, etc. Caldera is capable of that, but has to be set specifically to that mode.

COLOR MANAGEMENT FEATURES

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

The ColorSpan 72S is the only solvent printer that I am familiar with that has color management sensors on-board.

Otherwise, the HP Z-series of water-based printers are among the new generation with color management built into the printer. But that is not yet available on any HP-related solvent ink machine.

PRODUCTIVITY & ROI (Return on Investment)

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

All experienced printer operators know from experience that you can't expect the machine's fastest claimed output to be realistic. If you want true quality you need to add more passes which slows down the printer. But what the new Intelligent Interweaving technology offers is the ability to print at a relative speed but with the quality of a slower speed: so you get faster output at higher quality.

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

Dual CMYK mode almost doubles the productivity.

ADVERTISING CLAIMS: Anything Misleading? Any Hype? Slight Exaggeration?

175. Please look at the ad claims for this printer in magazines and on the internet. What aspects of these ads will a buyer of that model soon find out are perhaps slightly exaggerated?

Mutoh tends to be honest and restrained in its advertising claims. Mimaki is also restrained. Roland tends to have the most outlandish claims, most infamous is its "lightning speeds" or "blazing speed." I have yet to see any Roland printer flash lightning or blaze.

FLAAR is an independent institute and our value to end-users is that we do not accept all advertising claims. The reason that print shop owners, managers, and printer operators utilize the FLAAR Reports is because we have our own values. One example of our value is that I do not personally accept any ink with any kind of solvent as healthy for the environment. The closest to an ecologically acceptable ink would be bio-ink made by InkWare for Vutek.

I define an ecologically acceptable ink as one that you can install in your own home, and run every day there. If your spouse does not divorce you for endangering the health of your children, then that printer's ink is acceptable. Otherwise, no office worker should have to put up with working in any office that has unvented solvent ink of any kind whatsoever.

That stated, eco-solvent ink is definitely a step forward from full solvent ink chemistry, VOCs, and related problems. Although an air filter may not be required by law, it is certainly advisable by common sense. Air filtering equipment is readily available from both PAT and ICA (Island Clean Air).

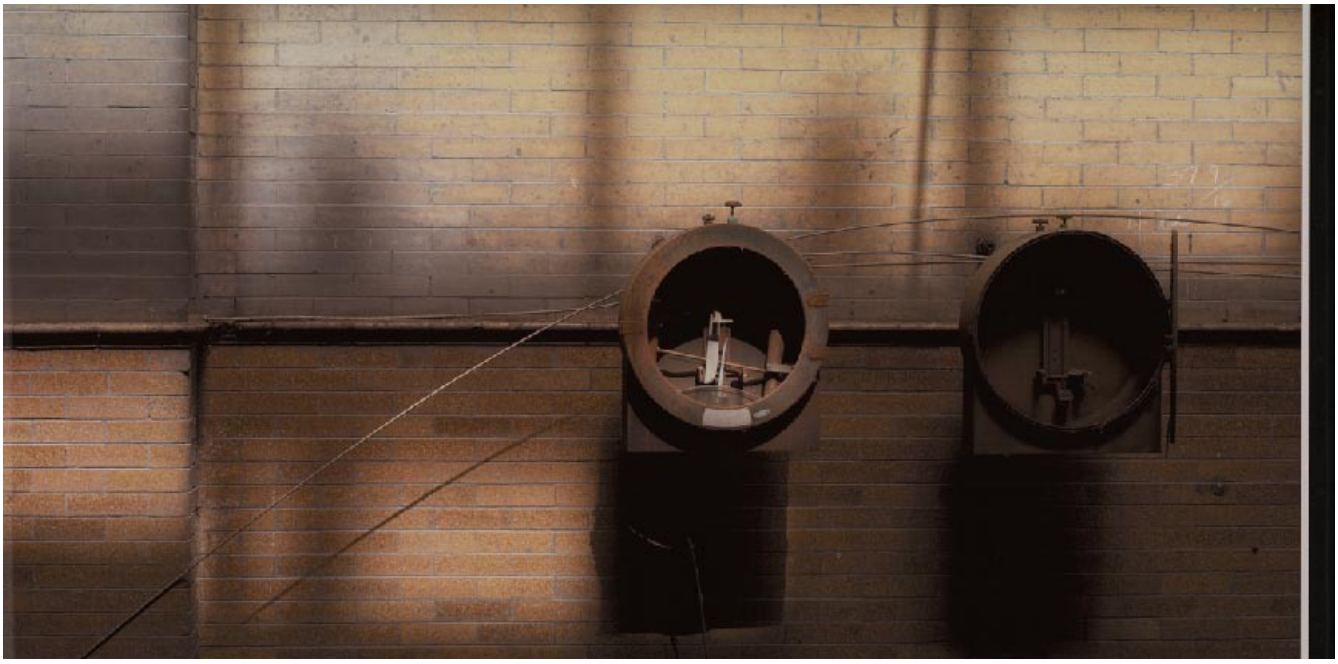
Some writers have tried to cover over the ecological backlash (the recognition that solvents of any kind are unhealthy) by claiming that the ink was originally intended to be called eco because of economical.

This misassumption by writers who have not met or talked with the managers at Mutoh who were the ones who actually initiated the concept eco-solvent is not true on several grounds: first, the individuals who first named the ink did not call it economical (it can't be economical because it costs multiple times more than solvent ink). Second, the people who first coined the word were seeking to distinguish it from carcinogenic full solvent inks. In this distinction I accept eco-solvent as a definitely preferable substitute. Please note that the economical term was not intended by the original developers at Mutoh to announce an economical solvent ink but to provide an economical/affordable solution for water-based printer dye/pigmented printer users to make first steps into the outdoor market, but still having the possibilities to produce high quality outputs.

What most surprised me about this printer was its high image quality. I had always naively associated solvent ink with splotchy output. But the image quality of the Rockhopper 3 Extreme is sufficiently good that during the tests we were printing fine art photographs.

176. How would end-user describe this printer? Easy to use, takes care of itself, does not require you to personally become a repair or maintenance technician?

A site-visit case study is advisable to learn what it is like in the real world to have this printer in your shop, but it is well designed, carefully constructed in a European factory, and is user-friendly.



COMPARISONS WITH OTHER PRINTERS

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

Nowadays there are so many Korean and Chinese printers that it's hard to make a selection. Now that HP has unleashed its formidable marketing clout with its HP 9000s and 8000s the choices are even more difficult. Roland continues to dominate sectors of the market (especially in Italy and some other European countries). Mimaki is still selling their venerable JV3 and now the JV5.

178. What features on the other printers turn them off?

When the HP 9000s first came out, the fact it's price was higher than the previous Seiko ColorPainter 64s version turned people off; the ink was also higher price; sales dropped dramatically.

HP does not offer any ink choice: they provide only mild-solvent.

On Chinese printers the main issues are: lack of tech support, lack of ability to return the printer if it simply fails to function or if it falls apart prematurely, lack of resale value, uncertainly of how long spare parts might be available, and infamous low quality of machinery built with a low-bid philosophy.

When I visit print shops that accept Chinese or Korean solvent printers (especially in Guatemala), when they do buy a Roland or Mimaki or Mutoh, they say clearly they notice the better quality of the non-Chinese printers.

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

Both Mutoh printers have the option to run dual CMYK. This effectively doubles the output speed so your productivity is higher. You can also select 6-color output when you need the benefits of light cyan and light magenta. These options are not available on any HP Designjet mild-solvent printer; and HP does not yet have any eco-solvent printer whatsoever.

To me a value of the Rockhopper 3 or Spitfire Extreme is that you know the complete origin of the printer; you know it is made in Europe. You know that spare parts are available; you can recognize it will have resale value in the future; and you can see up front that the print quality is impressive. This is a robust printer based on a proven chassis, using a mature print engine.

And most importantly, this is not a cheap copy of something else. A Mutoh printer is an original; there is no Chinese knock-off of Intelligent Interweaving technology, for example.ARY: Image

SUMMARY: Image Quality Issues Relative to Applications

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

Quality of printing text is excellent, better than I expected from an Epson piezo printhead.

Conclusions

Pros

- Quality is excellent. I rate the output as photographic quality, and I am very picky.
- One way to document this quality is to print out a test image of sample fonts; you can read text down to 3 pt type.
- You do not have to clean and purge daily (unless the heads are clogged)
- Ink costs can be lower because you do not have to constantly spit while idle, and don't need to purge so much
- Ink costs can further be lowered by using 540 dpi setting instead of 1440 dpi. You can achieve high quality at moderate dpi when you utilize Intelligent Interweaving technology. I tested this several times during the week in the factory demo room. It works (frankly I originally thought it was just an advertising ploy; but when I tested it, the technology actually improves print quality and at faster speeds).

- The printer is relatively easy to use, even for a first-time user.

- A recognized brand name printer, such as Mutoh, will have a resale value in three to five years. A no-name Chinese-made printer will have either no resale value whatsoever, or close to zip in even two years.

- Spare parts for a major international brand of printer will be available in future years to keep your machine running. With a Chinese-made printer, they change models every few months, and there is no guarantee that spare parts would be available in even one year, even in China, much less in Europe or the US or Latin America.

- Since I spent a week in Mutoh Europe facilities I can testify that incoming parts are rigorously inspected. Other parts are inspected at suppliers worldwide. This is directly opposite to most Chinese printers, where what counts is cheap cheap cheap. Low bid wins; as long as the part looks okay it is used; whether it holds up or not is immaterial. What counts is the lowest possible cost of the finished printer.

- This is a versatile machine: you can now print both outdoor and indoor jobs: you get the quality you need for indoor applications and the longevity you need for outdoor applications.

The best way to summarize the Rockhopper 3 Extreme is that you get effectively the handsome print quality of an HP Designjet 5000 or 5500 with multiple times the longevity outdoors.

Downsides

At industry conferences and seminars, ink chemists do not classify any solvent ink as friendly for your health. This is not my personal opinion, this is the universal statement of every industry person that has made comments about eco-solvent inks, usually spontaneous comments. The only thing I would accept is that these inks are not as harmful as full-solvent or even as mild-solvent.

If you would not mind having an ink being used in your own home, all week long, every week, then we classify that as an environmentally acceptable ink. I had a water-based printer in my girlfriend's apartment in Germany for over a year. She finally got tired of me working with it day and night, but there were no issues of solvent odor (since it was water based, which also smell, as does the media, but it's bearable).

However this ink is eco-solvent; the HP 8000s and HP 9000s use the stronger mild-solvent. By stronger this also means potentially more aggressive chemicals.

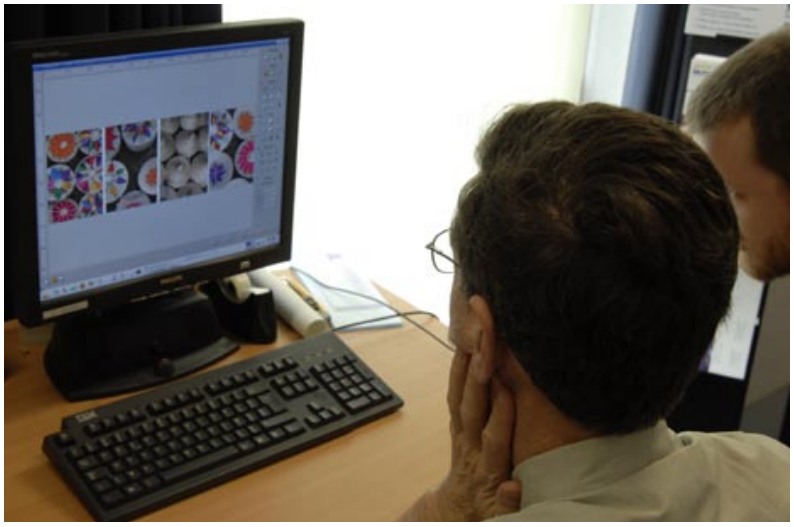
General Considerations

I recommend a RIP that can RIP on the fly (RIP and print simultaneously). Otherwise you have to wait for each sign to RIP, which can take several minutes (7 minutes even for a small sign).

Overall this printer had better quality than I expected and when I had an opportunity to take it for a test drive, it was much easier to use than I had anticipated. Indeed the quality was so good that when my former German girlfriend came to visit while I was at the Mutoh factory, I had two prints done of my fine art photographs with the Mutoh printer to give to her and her newly born daughter. The print quality was as good as any Epson or HP 5500 water-based printer and suitable for framing.

This is the highest compliment I can give any solvent ink printer, that it can satisfy my eyes by reproducing the output of a $30,000 Hasselblad medium format camera, Zeiss lenses, and a 22 to 39 megapixel PhaseOne digital back (we have tests with every current PhaseOne back).

Since I have zero patience when learning any new machine, I was not eager to sit down and try to do a print myself. Bruno however, was patient and convinced me that I should give it a test drive. So here I am at the controls, so to speak. It was easier than I expected. Actually easier than printing with the new 12-ink water-based printers that are on the market. Plus with eco-solvent Ultra ink you can do signage for outdoors.



Status of the current report

The present report is a combination of a Factory Visit, Demo Room Visit, and Third Look (because we have the User's Manual and close to virtually all the documentation that could possibly be located). So the present report is longer and more comprehensive than our reports for other printers. Since there are so many printer makes and models, it is not realistic to have this level of report on every single wide-format printer.

The next step is to have a site-visit case study. This is only realistic after the printer has been in use for several months, so the printshop operator, manager, and owner really know what it's like to use the printer in a real world environment.

Acknowledgements

I thank Nick Decock, Stephan Heintjens, Vanessa Daelman, Gunter Caus, Bruno Vierstraete for their assistance during the educational week in Oostende. This kind of total immersion in a printer technology and ink chemistries is crucial to understand the pros and cons of the vast range of wide-format production choices that face sign shop owners today.

Legal notice

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, usually 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 courses 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.

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. 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.

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. Trade show examples are 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. Four 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, 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 our two universities.

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.

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 it is 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.

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. For example there are three Mimaki printers we would love to have (their 8-color JV22, their newest textile printer, their new UV-curable ink printer).

Now that Symphonic inks offers a special version of a Roland, combined with Evolution RIP, offers a 12 color version of Epson's 10000 printhead generation which offers 32 passes, wider than Epson's 44 inch limit and less banding than previous Roland models, that would be the ultimate fine art giclee printing factory. But since that printer is not available to our university, and as these inks are not easily obtained, the art students on our campus use our HP DesignJet 5000ps, HP 5500ps, HP 130, Epson 4800, Epson 7600, and Epson 7800. The art department does museum exhibits and wins awards with the output. We are also looking at the newer 12-channel Canon iPF and HP Z-series printers.

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.

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.

Acknowledgements

Fortunately the university covers some of the operating costs of FLAAR on their campus. 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 9 employees the funding has to come from somewhere, so although the universities cover the core expenses, we do welcome project sponsorship, research grants, contributions that facilitate our educational programs, scholarships for co-op interns and graduate students, and comparable project-oriented funding from manufacturers. The benefit for the end-user is a principle called academic freedom, in this case,

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

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

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

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

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

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

FLAAR has existed since 1969,long beforeinkjet printers existed. Indeed we were writing about digitalimaging 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 substandard 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, Hewlett-Packard, Parrot Digigraphic, Color DNA, Canon, Gandinnovations, Mutoh Europe, Drytac, VUTEk, Zund, IP&I 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. 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 to our facilities while at Francisco Marroquin University 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. and Bogen Imaging for helping to equip our archaeological photo studios at the university and its archaeology museum in Guatemala. Heidelberg 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 Heweltt-Packard ColorPro printer on our list of recommended printers, but we love our HP DesignJet 5000ps so much we now have two of them, one at each university.

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

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

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

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

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

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