

**PAST, PRESENT AND WHAT
TO EXPECT IN THE FUTURE**

Wide-format inkjet printing technology



SIGN Africa 09 Johannesburg

Practical Sign & Digital graphics

R35.00 incl. VAT (SA) / R75.00 Outside SA 5500 Copies / 16 500 Readers

THE JOURNAL FOR THE VISUAL COMMUNICATION INDUSTRIES

ISSUE 43 SEPTEMBER / OCTOBER 2009

PAST, PRESENT, AND WHAT TO EXPECT IN THE FUTURE

WIDE-FORMAT INKJET PRINTING TECHNOLOGY

DR NICHOLAS HELLMUTH, FLAAR REPORTS

The September through November period of trade shows brings back the reality of wide-format inkjet printing. Despite the economic recession a lot is going on behind the scenes. The advantage for those in Africa is that Sign Africa in early September is the first of the international trade shows of the spring season.

The kinds of printshops that are considering purchasing wide-format inkjet printers is growing. We see the diversity from the thousands of readers of the FLAAR Reports who write asking assistance and tips in which kind of wide-format printer to consider. Plus we visit a lot of printshops all over the world: I hope to visit some in South Africa the day before the opening of Sign Africa. In the following paragraphs I comment on the major

kinds of printshops that will be buying UV-cured or latex or other kinds of wide-format inkjet printers this year and in 2010.

SCREEN PRINTING

If you are doing screen printing today, you probably already have a wide-format inkjet, or will in the next year or so. It will most likely be a UV-cured printer. Wide-format printers can do short runs, produce significantly better quality, and the inks are less lethal than most screen printing inks. Plus inkjet and digital technology are advancing every year; screen printing was a great technology in its day, but that day is waning.

CONTINUED ON PAGE 46



IN THIS ISSUE



SIGN AFRICA 2009 & IN-STORE EXHIBITOR CATALOGUE PG 54



KNOW YOUR TOOLS PG 90



MY FIRST DIGITAL SIGN EXPERIENCE PG 97



SIMPLICITY IS THE SOLUTION PG 74

086 1100 420
www.maizey.co.za



Tactile Graphics



Signs & Displays



Proud distributors of



www.signafrica.com



CONTINUED FROM COVER

PAST, PRESENT, AND WHAT TO EXPECT IN THE FUTURE WIDE-FORMAT INKJET PRINTING TECHNOLOGY

OFFSET PRINTING

Digital inkjet is now aiming for offset printing too. Short runs, instant production of usable images (without needing to have the printer get up to speed), and a smaller less complex printer offers many advantages of inkjet over offset. But it is not that inkjet is replacing offset totally, more as a supplement. The same is true of screen printing: they are not throwing their old machines away, but when they buy a new printer it is not a new screen machine, it is a wide-format inkjet. They are still using their old offset or their own screen printing systems.

PACKAGING

Packaging printing companies frequently write FLAAR and ask if we can help them move into digital printing for packaging prototypes and short-run printing of packaging, both on cardboard-like materials and on PP (polypropylene). In most cases these packaging companies are using flexo printing today but want better quality and the ability to do short-runs. In many cases the inkjet printers they need have to be custom-built, so FLAAR is working on establishing relationships with the manufacturers that are able to do this kind of assignment for packaging. This is because the speeds needed for packaging require one-pass or page-array inkjet printers (which are a fairly recent development).

Most inkjet printer manufacturers are concentrating on dpi and print quality. But screen printers and packaging printers need speed on rigid materials. The printer manufacturers who are after speed that I know the best myself are those whose factories I have visited in order to study them in detail: WP Digital (twice), GRAPO (three times), Durst Rho (five times; three to Brixen, Italy and twice to Lienz, Austria). Although print quality is crucial to these manufacturers, they are also aiming towards one-pass printing, or at least two-pass (most competing brands require four passes to achieve even billboard quality).

SIGNAGE PRINTING COMPANIES THAT ALREADY USE WIDE-FORMAT

But some your clients may be perfectly well served by various kinds of solvent printers. Although the popularity of UV-curing is rising, Seiko is a good example of the fact that mild-solvent printers still have a place even in the world of eco-solvent, UV-cured and latex ink. The new printheads in the ColorPainter

H-104s and H-74s are significantly faster than the older Seiko and the HP Designjet 8000s, 9000s, and 10000s. The heads in the H-104s are wider and at a higher firing frequency to achieve their improved speed.

GICLEE & FINE ART PHOTOGRAPHY

Epson was a leader in this field for years but HP and even Canon have been gaining market share. Their advances are primarily because their new-generation thermal printheads are significantly more advanced than past printheads. If you are interested in fine art giclee we suggest checking out ArtExpo and Art Business News. This is a growing industry in the US for over a decade but has not yet caught on in the rest of the world. Yet I have seen a leading artist from South Africa at ArtExpo each of the last two years.

Printers for fine art photography are what FLAAR specialised in for a decade, starting years before UV-cured and eco-solvent inks even existed. Our web site www.FineArtGicleePrinters.org is read by over 120,000 artists and photographers a year (and our www.digital-photography.org is read by over 360,000 photographers a year). Not many of these artists wish to have any kind of solvent chemicals in their homes or studios. So water-based printers have a future here, as well as in proofing, indoor signage and other traditional non-solvent applications.

TECHNICAL PRINTING

Printing for AEC (architecture, engineering and construction) is called technical printing. Most of the Hellmuth family in each generation are architects. Since my family background is architecture, I continue to keep track of printers for CAD and 3D renderings. HP has always held the lead in this market. Even the 'CAD' in the brand name Encad did not help them keep market share for very long (Encad had wide-format inkjet quite early). This is a market that thermal printheads have always dominated.

Our www.wide-format-printers.org is the web site where FLAAR keeps track of printers for technical printing (and for all water-based printers). This site is read by over one million people a year, showing that clearly there is still life in water-based printing despite the remarkable advances in chemistry and technology of UV-cured inks.

WATER-BASED PRINTERS IN GENERAL

FLAAR will be receiving an HP Designjet Z3200 printer to evaluate in-house, so this is the system we will be reviewing this autumn. Canon and Epson also offer water-based models. I did my initial evaluation of the Epson 7900 in their booth at the 2008 Sign Africa and look forward to seeing the Epson team again in 2009.

COLOUR MANAGEMENT

Although HP has colour management inside their Z-series printers, most production printshops realise that you still need an outside RIP software and colour management. We find that many professionals prefer Caldera RIP software and colour management workflow from BARBIERI electronic. We also recognise that ErgoSoft, Wasatch and Onyx are professional level in this environment, but we have more experience with Caldera for UV-cured and grand format printers.

Since Epson has been trying for almost two years to achieve on-board colour management, it is logical that Canon will attempt this shortly. However many large production printshops will still prefer to do colour management separately (with a full-scale spectrophotometer and associated ICC colour profiling software).

TEXTILE PRINTING & SUBSTRATES

Soft signage is increasingly popular; printing on vinyl is becoming passé. Signage made of fabric or textile-like materials move in the wind, and thereby attract more attention. Both dye-sublimation and direct to fabric options are now available from dozens of brands and models.

Nowadays there are also more choices for printable textiles. 3P Inkjet Textiles will be in the booth of Falcon. I expect to see other technical textile substrates of other European brands also. As with non-fabric substrates, it helps to have a known name brand, and it is essential to know precisely which factory makes your material (otherwise you have pot-luck as to what cheap material is in the shipping container one month that differs from the same brand's low-bid product the previous month). So FLAAR is initiating inspection and evaluation of manufacturing plants of substrates: the Obeikan factory will be our first in this new long range evaluation programme. End-users have already told us that substrates from this factory are better

than low-bid substrates from unknown sources.

IF YOU DECIDE TO GO UV-CURED, SHOULD IT BE FLATBED OR HYBRID OR COMBO?

Dilli and IP&I are each individually concentrating on combo-style flatbeds. Combo is the jargon for any printer with a moving transport belt (for a fabric printer the moving portion is usually called a sticky belt; for UV-curing systems the belt is not sticky).

Hybrid-style printers became popular by ColorSpan. These have the old-fashioned pinch rollers pushing the material down onto grit rollers. This works okay for rolled materials and some flat materials, but too many thick materials skew, stutter, or are not fed uniformly (since grit rollers were not originally designed to move rigid material). So more and more both clients and manufacturers are skipping hybrid-style printers and moving to combo or dual-structure flatbeds. Gerber would be an example of a dual-structure flatbed: a dedicated flatbed with a roll-to-roll bolted onto the front or side.

UV-cured in dedicated roll-to-roll manner became popularized by NUR (now HP Scitex). Gandinnovations then offered a solution, and now Matan, WP Digital Virtu RR50, VUTEk, and Durst Rho offer roll-to-roll solutions at 5-metre sizes that are good for billboards, building wrap, truck-side advertising and many other applications. The WP Digital and Durst have high enough quality to be okay for some POP signage as well.

The best printing system for thick flat materials is still a dedicated flatbed. There is no stutter, skipping, skewing or slipping on a dedicated flatbed. Here the Gandinnovations Jeti will be on display at Sign Africa 2009. The team that works with printshops in Africa is recognized as a strong portion of the Gandinnovations company.

GREEN PHILOSOPHY

Any company that tries to call their UV-cured ink "green" or "eco" is merely inviting a negative reaction. It takes more than a lack of VOCs to make an ink green. Two companies slyly slipped the word "eco" in front of their UV-cured ink phrase within the last year. This is not a good idea and should simply be removed. UV-cured ink has many benefits to printshop owners, managers, operators, and their clients for whom they print. But if you want a green ink, you need water-based such as Sepiax.

Eco-solvent and even full-solvent is still viable, but most printshop owners realise that they too are breathing the poisons (no matter how much ventilation is in the print room). We found on our building that most of what was vented out one side of

the building was sucked back in on the other side by the air-conditioning system.

Eco-solvent ink was an understandable concept for Mutoh and Roland several years ago, and then Mimaki, and now Epson. But as other inks come out that have fewer VOCs, then even the eco-solvent inks will face serious competition. There are plenty of inks already available today, that work perfectly with Epson piezo printheads that are significantly greener than any eco-solvent ink.

But all Japanese printer manufacturers are 100% backing their various flavours of solvent inks. Yet by SGIA 2009, ISA 2010, and FESPA 2010 these eco-solvent ink marketing strategies will, however, be hit with significant competition. By DRUPA 2012 eco-solvent inks of today will be past history. It is ironic that Mutoh, Roland, Mimaki, and Epson all could switch now and beat their new competition, but they all appear to be in lock-step with each other to remain with their eco-solvent philosophy seemingly forever.

Unfortunately there will be no forever for any kind of solvent ink. Bio-solvent was a nice theoretical concept but was not as practical as was hoped for. The newer inks from Sepiax in Europe are water-based and work in any current Mutoh, Roland, or Mimaki printer that was made for eco-solvent! The innovative inks from Kiian (Manoukian) have been taken over by Tricky and print on literally everything. They are alcohol based and still under development, but show that UV-cured (and eco-solvent) are going to be replaced within the next five years. None of these new inks need expensive printheads; they all work on the lowest cost heads, namely Epson. The FLAAR Reports lectures at Sign Africa will discuss these inks and show samples. But since we are still in the year 2009, and as the new inks are for 2010 and beyond, let us return to finish discussion of UV-cured printers.

WHAT IS AVAILABLE FROM TAIWAN AND KOREA?

GCC from Taiwan, IP&I and Dilli from Korea provide quality products and focus primarily on combo-style flatbeds (with moving transport belt). I have visited the factories and demo rooms of all three manufacturers. Of GCC I have visited three end-users (all were satisfied). I would estimate that Dilli and IP&I end-users would also tend to be satisfied. Korean and Taiwan printer manufacturers focus on reasonable quality at a reasonable price. D.G.I. produces solvent printers at a comparable level of expectation.

WHAT IS AVAILABLE FROM CHINA?

I have visited China in 2007, 2008, and recently in 2009, each time visiting several UV printer factories, demo rooms, and speaking at length with management and engineers. As a result I have a much better

concept of the kinds of printers that are being produced in China. For example, Sky Air-Ship produces wide-format dedicated flatbed UV-cured inkjet printers than all other manufacturers combined. So far 90% of their sales are inside China and primarily for glass and comparable architectural and interior decorating materials.

Textile printers are increasingly being produced in China, as well as heating units for disperse dye printers (especially from Mimaki, Mutoh, and Roland). The most innovative textile





printer from China is a Skyjet brand.

In the realm of solvent printers, I have visited the world headquarters for Wit-Color, Honghua, and five other comparable Chinese manufacturers. The various Wit-Color brands appear professionally designed and carefully manufactured. Honghua is a substantial company and the Challenger and Infiniti models for solvent ink produced by Honghua appear to be acceptable for their price range. However several different factories produce printers that end up being branded as Infiniti, so it helps to know which is which. FLAAR Reports provides complete inventories of every Chinese solvent printer brand, model, and manufacturer. But at the September 2009 lecture I will speak primarily on UV, textile printers, and new ink technologies.

THE FUTURE IN WIDE-FORMAT INKJET:

Page-array printheads (page-width)

Page-array means a complete row of printheads for each colour, so a total of four to six rows. Obviously this is terribly expensive: look at the price of an Inca Onset. So other companies are trying to find cheaper printheads. In 2008 VUTEK selected a lower cost head for their DS, but this project did not continue. HP is trying out its X2 MEMS head in order to keep the printhead cost down for a printer that requires hundreds of heads (at x-thousand dollars per head, using a Spectra class raises the overall cost of the printer into the stratosphere). So page-array printers today are priced at three million US dollars, and up. Obviously this limits their market, especially in an economic recession.

Single-pass (one-pass)

The alternative to page array is a one-pass system. These are also known as the scanning X-Y axis method. Instead of using hundreds of printheads for speed, they use precision to do their best to allow

printing at one-pass mode not to leave the ugly boundary line of each pass.

One of the early innovative products here is the Shark, from Grapo. One advantage of the Shark is a reasonable cost. Another new one-pass system is the Durst Rho 1000. I would estimate its price as close to a million dollars. I will picture several of the one-pass systems in my lecture presentation.

New & better printheads

Notice that the future of better wide-format printers is in printheads (and ink). Spectra is considered the printhead that is robust and long-lasting. As a result Spectra is favoured by Durst Rho and Gandinnivations Jeti. Other brands are considered more entry-level. Xaar has been successful in two different brands of new single-pass UV-curing flatbed printers. KonicaMinolta printheads are gaining market share in the mid-range. Printhead manufacturing flaws combined with issues of shipping the printers with the heads installed were also an issue for almost two years with one low-end model of another brand head in ColorSpan printers. But newer Ricoh heads are not known to have these issues.

MEMS printheads were hawked as the greatest invention to hit printheads about three years ago. Regrettably their yield rate was poor and those few printheads that survived the manufacturing process failed quickly. But some aspects of MEMS

technology are still useful in newer generations of printheads. It was unfortunate there was so much hype and such a failure for the five printer manufacturing companies that were brave enough to experiment with MEMS printhead technology. Those issues of faulty printheads were largely corrected by the end of 2008 but cost millions of dollars of loss for manufactures and end-users. Most MEMS models were simply abandoned.

Epson printheads of past generations were not usable for UV ink, in part because of the heating system required for UV ink. The newest generation of Epson printhead is claimed to be usable for UV-cured ink. A printhead comparable to the true cost of an Epson printhead today, if such a printhead would actually hold up in a UV-curing printer would be a huge breakthrough (needs to be about \$200, or less, to a manufacturer). But not one single printer manufacturer in the world is offering an Epson solution. To be polite I will not list the reasons why printer manufacturers do not wish to use Epson printheads for serious printers. The reasons are partially industry politics and partially technology.

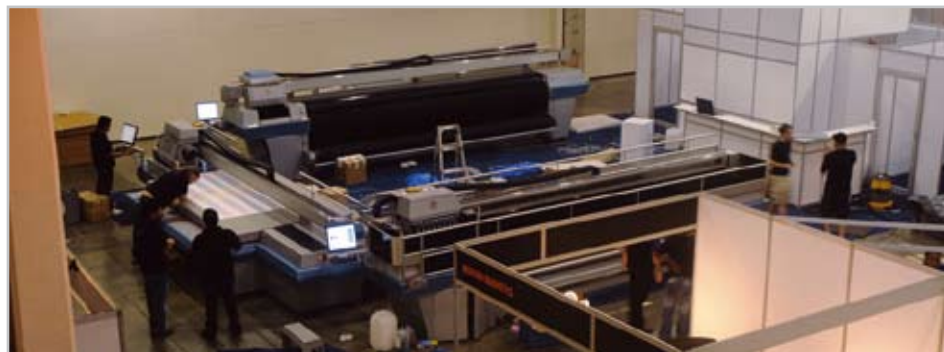
Since the printheads are the single most expensive part of a UV-curing printer, and since page-array printers need hundreds and hundreds of heads for a single machine, it will be a significant breakthrough when manufacturing costs can be lowered for a functional printhead. Unfortunately, several of the current low-cost heads have issues (as the designers of one abandoned flatbed printer project found out).

When you are shopping for a printer, be sure you understand the pros and cons of the printhead that is in the make and model of printer you are looking at. I will mention some of these aspects in my lecture.

Faster movement of materials

Every application has different needs: glass is heavy, and slippery. Cellophane-like material for packaging stretches (and melts under UV-curing lamps). Fabrics have other considerations when you need to move them through wide-format inkjet printers. But lets look at basic signage: on flat materials, "boards" of diverse materials.

Several printer manufacturer are trying to offer technology to handle lots of boards-per-hour. Since these printers are huge, they are rarely exhibited at trade shows: but



there are distributors in South Africa. The ScitexVision CORJet (HP Scitex FB6700) was an early solution. The HP Scitex FB7500 is a more recent development. The Durst Rho 1000 is another solution that is among the most efficient available so far. Grapo Shark and WP Digital Virtu provide models that seek to handle thick boards expeditiously.

So far most of these solutions are with a moving transport belt or with side-feeders (HP Scitex FB7500). Better solutions will result when printer manufacturers concentrate on more than dpi and printhead speed; they also need to handle moving the material in a manner to allow wide-format inkjet to compete with flexo, offset, and screen printing methods.

More latex ink

Latex ink from Hewlett-Packard is still relatively new but has proven to be a viable alternative to solvent ink for those companies who prefer to avoid health issues and who wish to lower VOC emissions. The HP Designjet L65500 will be exhibited at Sign Africa '09 where you can discuss it with Rob Makinson and others of Midcomp and HP. I have attended three training sessions on latex ink and have spoken with three different end-users who use latex ink in normal signage printing. Each of the three printshops was content with their decision to move to latex ink.

In my lecture I will mention what other printers can use latex-like inks.

Innovative inks that are not UV and not solvent (and not latex)

Although most of this article is on UV-cured ink, by next year you may begin to see entire new generations of wide-format printers using ink that is not UV, is not solvent, and is not latex either.

Should you wait for these future printers? No, use what is available today, because you need to be successful already today, so you can be ready for new technology tomorrow. If you lack a latex or UV or textile printer today, your competitors will be able to acquire clients in your area. I have spent time being trained on some of the new inks and will discuss these, and show samples in the lecture at Sign Africa.

Applications (other than signage)

Printing on glass is the fastest growing application. At the recent APPPEXPO trade show in Shanghai, more than 80% of the Chinese manufacturers of dedicated flatbed UV printers stated that most of the companies buying their printers were to print glass. Indeed one Chinese manufacturer even makes a special model of their flatbed to handle glass. When I saw this in their factory I felt it would be good to call it the Skyjet "Glass Master." This is Sky Air-Ship; they have sold over 150 flatbed printers in China alone, mostly for printing on glass. For raising glass up so you can move it off a dedicated UV-cured flatbed Sky Air-Ship

has a clever solution. Since more and more applications are unique, be sure that the printer you are looking at can handle the materials that you need.

Printing on glass is an application for Durst Rho and at WP Digital printing on glass is a project, initiated by Peter Ruth with Diana Dogaru carrying out the first phases. At FESPA '09 the extensive booth of GRAPO had one printer featuring printing on acrylic and glass.

For printing on ceramic tiles there are two main focuses: printing on raw unfired tiles (Durst) or printing on finished tiles (GCC is a leader here). I have visited a printshop in Taiwan where the company had developed special chemicals for printing on every kind of ceramic tile. Then in China I visited a Taiwanese company that partnered with a chemical company, to produce the entire workflow: primer, printer, special ink, post-printing top-coating. Again, this was GCC.

What is important for printing glass, ceramic tiles, or other smooth non-signage materials is adhesion. You will need a primer and sometimes heat treatment and sometimes post-printing treatment (usually a top-coating). Any company that does not have chemists or a special team to handle this entire workflow is just fluff and puff (trying to make you think that their printer can handle glass with no special needs). I would skip any such superficial approach and move to a more serious manufacturer.

I will cover printing on architectural materials in my lecture at Sign Africa in September.

SUMMARY

The future of wide-format inkjet printing is bright, despite the economic recession. Signage is still a viable market as the world economy bottoms out and then rebounds. Although dynamic digital signage

is growing, there is still plenty of market for printing signage with wide-format inkjet printers. The availability of inks that allow printing on uncoated materials without the expense of UV-curing systems will help bring down the cost of inkjet signage.

But the biggest areas of growth are for printing on materials other than only signage. So soft signage (printing banners on textile-like materials) is growing. I saw several textile printers in the booth of GSW. So at Sign Africa '09 you can ask Robert Franco about soft signage and textile printers. Plus printing non-signage applications on fabrics is growing even more: upholstery, curtains, and other interior decoration, plus fashion.

Wide-format printing of packaging

White format printing on glass, acrylic

Printing on ceramic tiles, both before and after firing

Printing on diverse other architectural materials for interior design

Printheads and inks are the absolutely crucial components. Futuristic far-out printheads are fun to think about but are not realistic for the real world in which printers actually need to function. Since page-array and one-pass machines are needed to insure the future advancement of wide-format printers, whichever printhead manufacturer that comes out with a head for page-array and one-pass that is superior, they will win the race. Such a future printhead will definitely be respected by the team at FLAAR Reports.



Nicholas Hellmuth
nhellmuth@flaar.org
www.wide-format-printers.org
www.fineartgicleprinters.org
www.digital-photography.org

