

Staying dry

Although waterless printing has been around for a while, it's mostly been seen as a niche technology, but thanks to greater awareness of environmental issues, more printers are now looking at going waterless

Ask a printer about consumables and they'll mention things like inks, paper and plates, but conventional printing presses use an enormous amount of water, a natural resource that we are all starting to think about conserving. It may seem strange that water has become such an issue, given that 70 per cent of the planet's surface is under water, but there is only a fixed amount of water on the planet and growing populations together with climate change has meant that in many parts of the world the demand for water far outstrips the infrastructure to collect, process and distribute that water.

The Waterless Printing Organisation quotes figures from Australian company JL Lennard that a typical five or six colour 102cm offset press uses around 12,000 litres of water per year. Most of this is used in the dampening system to ensure that the ink stays on the correct part of the plate.

Given that the average offset printer will have more than one press on the shop floor, even a relatively small operation could be using in excess of 25,000 litres of water per year. So, there's a good environmental argument for at least investigating a waterless printing system.

Water is not the only factor to consider in terms of pressroom consumables. There are different fountain solutions in use but most also contain various chemicals such as Isopropyl alcohol that produce volatile organic compounds, which can cause respiratory problems and damage the ozone layer. So, doing away with the dampening system and the need for water also eliminates the use of a whole host of other chemicals.

However, most of the VOCs emanating from a pressroom come from the solvents used for cleaning. But there is evidence from a Japanese study that there is less use of solvents for cleaning with waterless printing.

This research was carried out at a Tokyo-based printer, Bunseikaku, measuring VOCs from both its conventional and waterless printing operations, themselves located on different floors of the same building. This found that there was 75 per cent less VOCs coming from the waterless floor, then from the conventional operation.

Also, in a conventional system there is a delicate balancing act between water and ink but a waterless system will produce saleable sheets much quicker resulting in less waste paper. Most of the environmental impact of an

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offset press lies in the paper that is used, so reducing paper waste significantly reduces the carbon footprint of that press.

How waterless works

There's nothing new about waterless printing. It was initially developed by 3M in the late 60s with the Driography brand. But 3M was unable to make a satisfactory system and abandoned it, selling the patents to Toray Industries of Japan in 1972. Toray also bought patents from the Scott Paper Company, which had been looking at waterless technology. Toray went on to develop its first waterless plate, shown at the Drupa 1977 show.

Today, Toray is still the main supplier of waterless plates and has plates available in most common sheetfed and webfed sizes. Toray sells both analogue and CTP waterless plates, which boast similar performance to conventional plates. The CTP plate, for example, is good for 100,000 impressions with no pre-heating or post-baking. It can be used with UV waterless inks.

The Toray waterless plate has an aluminium base with a light sensitive photopolymer material bonded to the aluminium and with a thin coating of silicone rubber

on top of the photopolymer. This silicone layer is the non-image area and has a very low surface energy. The key to the system is that this silicone will resist the high viscosity inks that are used, thus obviating the need for a fount solution.

The Toray plates can be imaged with a standard 830nm thermal platesetter and there's a choice of processors from Toray or Koenig. They use a water-based developing system that can be discharged as regular wastewater.

The only other company of note making waterless plates is Presstek, which has used waterless technology in its



Filling ink pots - Class Colour makes inks suitable for waterless printing.

DI presses. Presstek has long developed chemistry-free, and more recently, process-less plates so using a waterless system for its printing presses made a lot of sense, and indeed many customers opt for a Presstek press specifically because of its environmentally-friendly credentials.

Beginning with the original Karat 74 developed together with KBA, the Presstek presses now include a UV model and a recently launched B2 machine, the 75DI.

However the Presstek DI plates cannot be used in a non-DI waterless press, and although Presstek's conventional plates are process-less they cannot be used with waterless presses.

One of the fundamental weaknesses in advocating a waterless system is the lack of competition. Only

Presstek's own plates can be used in its DI presses, and for most other waterless presses the Toray plate is the only option. Most printers like to have a choice of plate suppliers, fearing that a single source will lead to high prices.

However, Christian Knapp, managing director of KBA UK, strikes an optimistic note, saying: "It is our view that as waterless becomes more successful so new entrants will come into the field and with competition we should see a change in the pricing."

Inks

Fortunately there are a number of companies supplying inks for waterless printing. Generally speaking, these inks have higher viscosity than conventional inks. David Grey, managing director of ink manufacturer Classic Colours, says: "Waterless inks are made so that they don't pick up on the silicon non-image areas of the plates and the trick is to make sure that their rheology and formulation is such that they do that as best they can."

Knapp says: "The inks are more expensive but because of the very high level of pigmentation the same amount of ink lasts much longer in terms of usage than would be in the conventional ink so whilst the prices are higher you get more mileage out of it and that needs to be considered."

Temperature control

Apart from the specialised plates and inks, the press itself will also have to be adapted with the addition of a cooling system. Temperature control is very important in a waterless system because there is no water to cool the surface of the plate. This leads to greater friction, in turn warming the plate cylinder. Also, because the inks have higher viscosity, there is more friction generated by milling the ink through the rollers. Grey explains: "If the press gets too hot, in most cases above 27-28 degrees C, then the ink will get low in viscosity and start to pick up on the silicon non-image areas."

He adds: "The press has to be modified with temperature control normally done by pumping temperature

controlled water through the oscillating rollers which are normally cooled anyway in modern high speed presses, certainly web presses. The changes cost money but you can forget your dampening and all the other chemicals that go along with it.”

Some presses are designed from the outset as waterless presses. KBA, for example, makes the web offset Cortina press widely used around the world for printing newspapers such as Le Figaro. KBA also produces the Genius 52UV, primarily for printing to plastic and carton.

It is however perfectly possible to order a new press and have it set up for waterless working, or even to adapt an existing press. Steve Cavey, marketing manager for Heidelberg UK’s sheetfed products, says that it depends on the age of the press: “The ductor roller and the inking roller all have to have hollows so that you can send the chilled water down and be recirculated through the machine.” He says that it’s best if each colour can be individually controlled but that some customers have used a blanket temperature control on shorter runs.

One of the few companies in the UK that uses waterless printing purely for general commercial work is Park Lane Press in Wiltshire. This company went down the waterless route 11 years ago because of problems with a high mineral content in the local water supply which lead to problems on press such as bump lines. Park Lane uses two Komoris, a 628 and 428.

Phil Sudwell, managing director of Park Lane Press, says: “We did a couple of extra things to the press but it’s more about the press room environment because it is all about temperature of the ink to the plate so we have got a humidity control and air conditioning so we can take out those variables.”

He adds: “We have zonal temperature control in terms of chilled water going through the rollers so you can change the temperature of the water running through the steels on the black unit for example, then you can have a different temperature on the magenta, but that’s just a specification when you get the machine. But even

that is not such a big issue unless you are doing very large runs and generating a lot of heat.”

Benefits

The costs associated with waterless, in terms of plates, inks and press modifications, mean that it has mainly been a niche technology, exploited for its ability to print to difficult substrates, particularly plastics. Grey explains: “When you print on plastic with dampening



Christian Knapp, managing director of KBA UK

the dampening solution wets the surface of the plastic and the next printing unit doesn’t like to transfer because its wet whereas with waterless you completely eliminate that problem for plastics, foils and so on so the label industry for plastic cards, and CDs and so on are usually done waterless.”

However, waterless printing can also lead to better image quality on paper. There’s much lower dot gain with waterless which allows for the use of higher screen rulings giving improved detail reproduction as well as overall sharpness. It also offers better colour consistency, colour saturation through higher ink densities.



These plates from Presstek are for its DI presses, where waterless technology has helped automate the press operation.

Sudwell says that the quality outweighs the costs: “On uncoated papers we get a fantastic lift whereas on conventional printing the sheet goes very flat and you lose that vibrancy of colour on uncoated stocks but you can maintain it with the waterless process so we get a very good following for uncoated work for the results that we get.”

In addition, waterless presses are also easier to use because the lack of a dampening solution means that there is a lot less control over the press. This lack of control can be a problem for some operators but there is still some room for manoeuvre in varying the temperature. But for the most part it means that the colour balance has to be got right in the prepress stage, which in turn leads to more accurate proofing, and far greater consistency across a print run and any repeat jobs. This, of course, also means that it is easier to train staff and to replace skilled operators when necessary.

Another benefit of waterless printing that is sometimes overlooked is the lower cost of maintenance. Sudwell says: “There’s no wear on the machines that you would get on the conventional press on the back cylinders so we don’t have all the problems with the rollers pitting, the ink emulsifying on the rollers and the calcium pinching the rollers.”

Conclusion

Many printers believe that waterless printing is more expensive than conventional offset. But this is not necessarily the case, as Grey points out: “The equipment is more expensive to start with, the plates and inks are more expensive but I would say it works out pretty much the same and you get better quality.” It’s a reasonable assumption, given that the chemistry and waste management costs are lower, there’s less paper wasted in makereadies and less cost in training and maintenance.

Waterless printing is more common in some areas, such as Scandinavia, than others, mainly because those countries have stricter environmental rules, and their people are generally more careful about their environmental impact. However, as water consumption becomes a more pressing issue everywhere, and we all become more environmentally aware, so the number of waterless printers around the world is likely to increase.

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