

Digital Printing White Paper

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Digital printing, the advantages and disadvantage of printing digitally compared to offset printing

History

Digital printing burst onto the scene at the IPEX trade show in Birmingham in the UK in 1983. There were two machines launched at that show — the Indigo and the Xeikon digital presses. The Indigo digital press, built in Israel, was launched with much fanfare by Benny Landa, the managing director of Indigo. The Xeikon was built in Belgium. The Indigo is a sheetfed press and the Xeikon is web fed (reel fed or roll fed) press. Both of these early presses were not without their problems and made life challenging for early adopters.

In 1983, Benny Landa famously prophesied that within 10 years 50% of all printing would be produced digitally. Seventeen years later approximately 10% of all printing is produced digitally. Digital printing quality has progressed rapidly to the point where there is now virtually no difference in quality between offset and digital printing. Most printers now would feel they are disadvantaging themselves if they are unable to offer digital printing.

The main players in the market these days are as follows.

Indigo, now owned by Hewlett Packard (HP, thus HP-Indigo). There are many models. They are sheet fed, and use liquid toner. All other digital presses use toner in the form of fine powder. All digital press manufacturers make colour presses and with the exception of Xeikon, presses to be used only for black and white. Many manufacture presses for specialist applications such as for label printing.



Xeikon. There are a great many Xeikon presses in Europe and the USA, but only a few in Australia. Paper comes on reels, and the availability of a wide range of paper stock has always been an issue in this country. This is a great pity, as the reel fed nature of the Xeikon give advantages of speed and variety of formats over conventional sheet fed presses.

Xerox, represented in Australia by Fuji Xerox. Xerox make a vast range of sheet fed presses from small entry level devices up to the iGen 3 and iGen4 industrial strength machines.



Kodak. Kodak make the NexPress. The NexPress, a sheet fed press, was originally developed in co-operation with German offset press manufacturer Heidelberg, who sold their interest in the machine to Kodak. There are several models. They are vast, heavy, serious industrial strength machines with some unique capabilities, including some remarkable coating options.



Canon. Canon is a reasonably recent entrants into the world of high end, industrial strength digital presses. They now offer a range of sheet fed presses, one of which has some interesting coating capabilities.



Konica Minolta. Konica Minolta make range of sheetfed digital presses which are gaining an increasing market share thanks to excellent performance and reasonable cost.



Océ. Océ manufacture a range of colour and black and white digital presses which are gaining increasing acceptance in the marketplace. Océ are particularly strong in the black and white market.



There are a number of other manufacturers but the brands listed above would account for the vast majority of digital presses in operation in Australia today.

The technology

It is important to understand the difference between the way digital presses and offset presses operate. Offset presses operate by transferring an image from a blanket to paper. The image is transferred to the blanket from a series of plates. Plates are usually made of aluminium or polyester and every time there is to be a change of image new plates are required. Offset presses run very fast -- up to 15,000 impressions per hour or faster. The great advantage of offset presses is their ability to print vast quantities of the same image in a very short period of time. Every time there is to be a change of image the old plates must be removed the new plates which have been previously imaged placed on the press and after a period of time when the plates are “run up”, the press is ready to proceed with the next part of the job.

Colour printing is made up of a mixture of four colours cyan magenta yellow and black. Offset presses use a separate plate for each colour, and another set of plates for the next image and so on. If different colours are to be used (Pantone colours instead of CMYK), additional expense is incurred cleaning the press and changing the inks. Offset presses therefore are very good for long runs of the same job but slow and expensive for short runs. The process of making new plates and “running up” the press is known as “make ready”. If the press has to be stopped and a new set of plates and a new make ready put in place for every hundred copies of a job, it is obvious that this would be an extremely costly and slow process. This is where digital printing comes into its own.

Images to be printed on a digital press are transferred electronically to a belt, a drum or drums, or a blanket. No plates are required, there is no ink to be washed up and changed, and there is no make ready. It is possible to switch from one job to another or from one part of the job to another in almost no time. These characteristics provide digital presses with great flexibility and it is possible for each sheet that comes out of the press to be different. Furthermore, digitally printed products can be “finished” (coated, guillotined, bound etc.) immediately because there is no need to allow time for the ink to dry.

Why, then, isn't everything printed digitally?

There are many reasons.

Firstly, digital presses are very slow compared to offset. they operate at around 25% of the speed of slow offset presses.

Secondly, the range of papers that can be used on a digital press is very limited compared to what can be used on an offset press. Digital presses generally require smooth paper — they do not handle mottled paper, paper with uneven surfaces — well at all. This is because all but one make of digital press use dry toner in place of ink, and toner does not spread evenly if the paper has “hills” and “valleys” in it. Some digital presses are able to cope with this kind of issue better than others. Furthermore, digital presses are usually limited to 300gsm or slightly heavier in the thickness of paper that can be passed through the press. Offset presses can usually print on much thicker card stock.

Thirdly, the format of digital presses is small. Most can print A3 or slightly larger, whereas offset presses can print up to four times larger. This conveys a massive advantage for long runs. If you can print at four times the speed, and, say, three times the paper size, throughput is twelve times faster, so a job that takes twelve hours on a digital press would take only one hour on an offset press.

Fourthly, the cost of running a digital press compared to an offset press (once you own it!) is very much higher. Digital presses are delicate, demanding, finicky devices, and they require a LOT of service. Manufacturers are typically remunerated for this service by charging their customers an amount for every piece of paper the machine produces, usually known as a click charge.

Fifthly, it is much more difficult to add a coating to digitally produced printing. Coatings are usually added to add protection (in order, for instance, to prevent scuffing), or enhance the appearance of the printed product. Coatings are usually in the form of spot or overall varnish (an extra coating of an ink like substrate, added during or after the

printing process), or a laminate or celloglaze, which is in the form of a layer of a plastic material that is adhered to the printed product using a combination of pressure and heat. Varnishes often react with digital toner, and laminates or celloglazing can be difficult because digital presses generally add a layer of oil or wax to create a slightly glossy finish, and this makes it difficult to adhere the plastic to digitally printed products. Coating of digitally printed products tends to be much more expensive than for offset printed products.

Lastly, in the earlier days of digital printing, quality was an issue. In particular, digital presses were notorious for printing large areas of flat tints unevenly. This is rarely an issue these days, but early problems have left a legacy of suspicion.

What is the ideal job for a digital press?

Short runs

Digital presses excel — they are the only way to go — for short runs. What, then is a short run? The answer can be similar to “how long is a piece of string”. One thousand copies of an A4 flyer would be printed digitally. 1500 or 2000 copies would probably be printed offset. Short runs of books and booklets are perfect for a digital press, which can print anything from just a few copies up to, say 500 copies, more economically than offset. Short runs of postcards, greeting cards and calendars are ideal for digital printing. Learn more about the advantages of short run printing at www.kainosprint.com.au/PODandSave.shtml.

Books

Digital printing has revolutionised book printing. It has provided authors with the opportunity to self-publish, thus by-passing the whole publishing industry, and enabling authors to retain the considerable margin they would otherwise lose to publishers. Self publishers can test the market with very small runs, and (perhaps surprisingly), retain greater control over both design and quality. Furthermore, authors can “print on demand”, printing a small run, then reprinting when the first run is sold out, and so on. This strategy greatly reduces the financial outlay otherwise required. Authors of specialist interest books such as family histories, local histories, year 12 school books, children’s books, fund raising books, theological journals, specialist medical books, and a vast array of other topics can print in quantities they can realistically expect to sell. There are many resources available on the internet to help self publishers prepare, print, then publicise their books.

Booklets

A booklet is generally defined as less than about 60 pages, and bound with staples in the spine (saddle stitched) rather than perfect bound (glued in the spine and with a square spine). Any such short run publication is a candidate for the benefits of digital printing. Such booklets might include recipe books, DVD and CD inserts, product information guides, training manuals, catalogues, theatre programmes, diaries, children’s books, music instruction books, tourism booklets, internal handbooks, price lists and the like.

Calendars

The calendars we all see in newsagents are mainly produced overseas, and in quantities of tens of thousands. They have a certain sameness and predictability about them. Digital printing enables individuals and organisations such as businesses, voluntary organisations and charities to produce very short runs of totally unique calendars — anything from about 25 copies upwards — in a variety of formats for prices that make calendars very attractive promotional and fund-raising products (users will be reminded of the organisation from whom they obtained the calendar every day of the year). Canny digital printers will do all the work, so all the customer needs to supply is photos, any special dates they need to insert, logos and captions.

Flyers

Digital printing is perfect for short runs of flyers used for such diverse purposes as newsletters, menus, tourism brochures, art catalogues, products promotions, event promotions, in-house information dissemination, real estate purposes and so on.

Greeting cards and postcards

One of the greatest advantages of digital printing is that many different designs can be printed for very little additional cost. There is not a great deal of difference in the cost of producing 1000 greeting cards or postcards that are all the same, or 1000 greeting cards or postcards consisting of fifty each of twenty different designs. This feature of digital printing enables greeting card or postcard designers to test the market by printing a large number of designs, then refine the range depending on which designs turn out to be the most popular.

Posters

It can be a big challenge to have appropriate quantities of large format posters, particularly the popular A2 size (420x594mm) printed. Only one digital press is capable of printing as large as A2. Wide format inkjet printers can print A2, A1 (594x840mm) and even bigger, but only in very small quantities — up to about twenty copies — before the price becomes uneconomical. Offset presses cannot print economical quantities much below about 500 copies, so what happens if you want 200 posters, say 50 each of four designs? Xeikon digital press to the rescue! The Xeikon prints 500mm wide and any length, and at economical digital printing prices.

Other products that can benefit from digital printing

Bookmarks, stickers, labels, presentation folders, office stationery, business cards and fridge magnets all benefit from the advantages of digital printing

Time sensitive printing

If a job is time sensitive — wanted same day or the following day — such requirements can usually be met using digital printing. Time must be allowed for offset printed products to dry before they can be “finished”. In addition, there is a culture issue. There is a culture common in large offset printing companies that jobs will take a week or so to be printed and finished, whereas the culture in the digital printing industry is for much more rapid turnaround. Because of this culture, large offset printing companies tend not to make good digital printing companies.

Variable data

One of the characteristics of digital printing that sets it apart from conventional offset printing is the ability of digital presses to make every page that comes out of the machine different from the page before it. Because the information on each page is constructed electronically and is not physically burnt onto a plate, as in the case of offset printing, it is possible for each page in a print run to differ from the page before it. The degree to which each page differs from the preceding page might be slight or very significant. For instance, a simple case might involve just the name and address on a flyer changing. A more complex application would involve complete slabs of text, photographs and background colours changing. Each page doesn't have to be different. A print run of say 1000 pieces, might consist of 50 different sets of 20, just as it might consist of 1000 different pieces.

‘Variable data’ has been in use for over ten years, and there is abundant evidence to show that a well targeted and designed variable data piece will attract a response many many times higher than a conventionally printed piece with no variable content. Responses as high as 25% or even more have been recorded, compared to one per cent or less for conventionally printed pieces.

Learn more about variable data printing at www.kainosprint.com.au/VariableData.shtml.

What kind of print jobs are suitable for variable data?

There are at least three answers to that question. First, organisations with a problem may find a solution in the use of variable data. The problem might be something like ‘how can we increase brand loyalty’. Second, variable data campaigns are suited to organisations who sell services or manufactured items with a high unit value — the car industry and the health insurance industry are two examples. Third, variable data campaigns might be used by organisations seeking to strengthen relationships with their customers, without necessarily seeking to sell something. The use of highly personalised invitations might be used in such a scenario.

The future of digital printing

Offset printing has not taken the intrusion of digital printing into its domain lying down! Press manufacturers have sought to compete with digital printing by making it more cost effective to print smaller run lengths. They have sought to do this in the following way.

By the development of presses with faster and less expensive “make ready” time. Make ready involves changing plates onto which the images have previously been burnt, cleaning press rollers if required, and “running up” the press in order to attain the correct colours and registration — perfect positioning of the plates. Make ready time has come down from a minimum of around twenty minutes and today can take anything from about five minutes to over half an hour with very large presses.

By making plates less expensive. All offset presses require plates of some form or other. The classic material used is aluminium, but various forms of plastic, polyester and even paper are also in use. For full colour printing, a set of four plates is required every time the content of a page changes. One way offset press manufacturers have sought to compete with digital printing has been to reduce the price of plates. A set of plates will cost anything from around \$20 to well over \$100. Furthermore, time is involved in removing the old plates and fitting the new ones.

By making it easier and less expensive to make plates. The process of burning plates has become progressively easier thanks to the now almost complete adoption of computer to plate technology. Plates still require chemistry to “develop” them (as in film based photography), although various forms of processless plates are finding their way into the market. Plates are usually burn off line using “computer to plate” technology. Another way press manufacturers have sought to close the gap between offset and digital has been to develop presses that image plates on the press, using rolls of plate material which are advanced automatically and burnt as required.

By making the whole printing process capable of being operated by non-tradespeople. Press manufacturers have sought to “democratise” the printing process by making it accessible to operators who have not been down the traditional apprenticeship path to learning the trade. Innovations such as the automation of registration and colour, automated press clean-up after a run, on press imaging of plates and processless offline burning of plates make it easier for press owners to find operators for their equipment.

It should be obvious from the above explanation, however, that there is still considerable cost associated with setting up for a print run on an offset press. None of these expenses are incurred in setting up a print run on a digital press. However once an offset press is running, the cost of producing a sheet is only a fraction of the cost of producing a sheet on a digital press. Consequently shorter run lengths are cheaper to produce digitally. Once the run length cost advantage for digital ceases, then offset is cheaper, and the price gap widens the longer the run length. At that point the only justification for printing digitally is speed — and that applies only up to a point.

For all the reasons explained above, as far as this writer is concerned, offset printing will never successfully challenge advantages of short run digital printing.



A Creo (Canadian company) DI (direct imaging) offset press, developed to make press operation possible by non-tradespeople, to speed up the whole printing process, and reduce the viable run length to somewhere around 250-300.

Digital printing, in turn, has not taken the increased competition from easier to operate, faster to prepare and to some extent cheaper offset printing lying down.

Offset printing has been around for 200 years, digital for less than two decades, so innovation in the development of digital printing continues apace and the industry is seeing ever increasing quality, speed, and the capacity to print on a wider range of paper and card stocks, including lighter no carbon required and heavier textured stock. We haven't seen it happen yet, but as digital presses become more reliable, "click" charges will come down. We are seeing equipment prices from some manufacturers starting to come down significantly whereas other, perhaps more established manufacturers, continue to sell digital presses at premium prices.

For a decade or so, very high speed inkjet technology has been touted as "the next big thing" in digital printing and one or two manufacturers have placed a great deal of faith in the industry developing in this direction. Quality has always been the issue, and to date inkjet technology is restricted to such applications as the printing of statements in the financial sector.

About the author

Andrew Hingeley is one of the original pioneers of the digital printing industry. In 1997, his company purchased one of the first industrial strength digital presses in Australia, and he is acknowledged as the first person to actually make digital printing "work", when his company started producing quality work in sufficient quantities to be profitable. He has travelled extensively overseas researching digital printing, where, in the early days of digital printing, he discovered what was possible, and proceeded to drive Australian distributors and technicians to distraction, insisting they implement what he had discovered. Mr Hingeley has been involved with publishing and printing since 1967 firstly as a bookseller, and from 1986 onwards, as a printer. His expertise is widely valued in the industry and by kainosprint.com.au customers. Visit www.kainosprint.com.au where your digital printing requirements will be in safe and experienced hands.