Environmentally friendly printing

A white paper by Andrew Hingeley of KainosPrint.com.au (updated 22/7/09)

INTRODUCTION

As we all become increasingly aware of our responsibility to protect the environment, reduce carbon emissions and tackle global warming, the printing industry is coming under increasing scrutiny. This white paper has been produced to provide basic information to help customers understand the issues involved so they can make informed choices.

Printing is a mechanical task that involves many factors including the equipment used to print, the ink or toner used, the substrate on which the job is printed, whether water is used in the process, cleaning up afterwards, packing and transport. This paper looks at several of these elements.

When customers think of the environment with regard to printing, they almost always consider paper as the first and usually only consideration. We think the equipment used is equally and in many cases a more significant environmental factor. Customers have often researched their paper options and finished up becoming more confused than before they started out.

ENVIRONMENTAL CONSIDERATIONS CONCERNING EQUIPMENT USED TO PRINT

Almost all printing is produced using offset or digital technology. The percentage of printing produced digitally is growing all the time, and is currently somewhere around 15–20%, but growing at an ever increasing rate.

Digital printing

Digital printing is an inherently more environmentally friendly process than conventional offset printing.

Digital printing uses less paper. Digital presses print the exact number of copies you want. Conventional offset presses use a lot of paper ‘running up’ the press to achieve the correct colours. If we print a job digitally, we may print two or three sheets at the start of a print run to ensure pages are in register, and front to back registration is correct.

Customers whose jobs are being printed using conventional offset are often persuaded to buy more copies of a job than they really need (go on, take 5000, it will only cost another $50.00). More paper than is necessary is used, more storage is required, and inevitably when the job becomes out of date, it must be disposed of — all consequences that are environmentally unfriendly.

Digital presses are not messy and no chemicals are required to clean them.
Digital printing involves an image going directly from a computer to the press, and then onto paper. There is no need for film or plates, and the associated need to develop them using a chemical process.

Offset printing

Conventional presses, however all require the use of plates for an image to be transferred to a blanket and then to paper. These plates are usually made of plastic, polyester or aluminium Sometimes a digital image is transferred to film, which means the film must be developed, then the plates made. 'Direct to plate' has become the new 'standard', but the use of plastic, polyester or aluminium is still required, and the plates must still be chemically processed. In addition to developing and washing the film and plates, chemicals, film and plates must be disposed of. It is a dirty, wasteful process and is an excellent incentive for the environmentally aware customer to choose digital printing wherever possible.

Conventional presses must be cleaned, often with toxic solvents. Such cleaning solutions must be disposed of in a responsible manner, but this is sometime difficult to do.

It would be remiss not to acknowledge that offset printing is making giant strides to become more environmentally friendly. In addition to paper, which is discussed below, there have been improvements in ink, a reduction in the use of water and alcohol use in the printing process, and in the use of smaller, more energy efficient presses.

Energy consumption

Digital presses are energy efficient, using only modest amounts of energy. Conventional offset presses are high consumers of energy. The whole process of plate making consumes energy, and in the case of aluminium plates, great amounts of energy.

The presses themselves are often huge beasts weighing many tonnes, with massive inertia to overcome to start them rolling.

Conventionally printed material comes off the press wet, and nothing can be done with it until it is dry. Therefore most presses employ an inline drying process which is a big consumer of energy.

Ink and toner

Ink

Environmentally friendly biodegradable vegetable or soy oil has replaced mineral oil and petroleum as the base for much printing ink. Print quality as well as runability — how it all performs on press — is at least as good, and sometimes better, than the older technology.

Because vegetable oil is lighter in color and cleaner than petroleum, colours can appear brighter.

Several factors have gone into cleaning up printing in recent years. Among them are tougher government standards about what can be dumped in landfills or incinerated, proper disposal of toxic substances, nationwide recycling efforts reaching to the residential level, printing customers requesting environmentally friendly products, and soaring timber prices — most paper starts out as a tree.

Recycling doesn't apply just to paper; waste ink is recycled too. And, to help improve indoor air quality in their production facilities, printers are moving away from using alcohol-based solvents in their presses in favor of non-toxic alcohol substitutes or even water as part of the process. The odors are far less than for petroleum inks and that improves indoor air quality.

Toner

Companies such as Xerox are now producing a more environmentally-friendly toner, called emulsion-aggregation toner. It takes about 30% less energy to produce, and Xerox is better able to control the size, shape, and structure of the toner particles, leading to improved print quality, less toner usage, less toner waste and less energy required for manufacturing toner and for printing.

Another major manufacturer of industrial strength digital presses, Konica Minolta, uses Simitri HD polymerised toner technology. By including wax in the toner, silicon oil is not required in the printing process. The process does not require such high temperatures, resulting in high energy-saving and emission-reducing effects. Furthermore, the manufacturing process of Simitri HD toner is environmentally friendly, reducing the generation of CO2, NOx, and SOx by approximately 40%.

PAPER

Some facts concerning paper recycling

- In Europe between 2000 and 2007 the growth in the paper recycling rate was double the paper consumption growth rate.
- Waste paper going into landfill has low toxicity and continues to lock up carbon for an extended period.
- Recycling paper products retains carbon stored in the fibre.
- Water is recycled up to five times in producing paper before being cleaned and returned to the environment, often cleaner than when it first arrived at the paper mill.
- In 2007 Australians recycled 3032 million tonnes of paper — 72.5% of consumption, amongst the worlds highest.
- Paper recycling rates are the highest of commonly used products (higher than steel, glass and plastics)
- About 20% of paper cannot be recycled due to food contamination, archiving or becuase it is ‘stored’ in books etc.
- 80% of home delivered catalogues are recycled in Australia and around 75% of newsprint.
- The Australian Council of Recyclers (ACOR) reports that 61.5% of the fibre used to make paper and packaging board in Australia is from recycled paper and board.
- Owing to fibre deterioration paper can only be recycled 3–5 times with new virgin fibre needed to be continually added.
- Using recycled fibre to produce new paper can lower energy use during production.
- Producing higher quality papers from recycled paper requires chemicals in order to de-ink and requires additional bleaching.
- Recycled paper and board is best used to produce packaging boards, newsprint, and natural shade and coloured printing papers.
- Packaging with direct contact to foodstuffs, or production of high white papers where additional de-inking, bleaching and energy is required, are not suitable uses for recycled paper.

Like everyone these days, print buyers want to do the right thing for the environment and will often choose a stock that is going to be the least detrimental to our world. Does the print buyer go with recycled? FSC? EMAS? FDA? ECF? Or ISO14001? What does it all mean?

Paper types

Recycled paper
Recycled paper is manufactured with recovered fibre. Recycled fibres have been extracted from existing paper products, to be used in the manufacture of further paper products. Recycled paper can be 100% recycled or mixed with virgin fibre to improve consistency. Fibres can normally be recycled 5-6 times before they break down. In Australia, recycled papers should contain a minimum of 20-30% post consumer waste.

Post Consumer Waste (PCW)
PCW fibre is made from reprocessing or de-inking paper that has been used by a consumer. It is considered the most environmentally efficient as the fibre has completed a useful life before re-entering the cycle.

Pre Consumer Waste
Waste that has left the mill but has not reached the end user, typically trimmings and rejected materials from printers, envelope converters, etc. Pre consumer waste has often not been printed on and requires less de-inking.

Forestry

Paper is made from timber, so forestry management is crucial. The majority of paper in Australia will come from mills that can certify that their pulp has been sourced from responsibly managed forests. This means no old growth logging. FSC and PEFC are the leading fibre or wood certifications.

FSC — Forest Stewardship Council
A World Wildlife Fund supported, international, non-profit organisation. FSC works to promote responsible forestry, conserve biological diversity and protect old growth forests. There are currently some 93 million hectares of the world's forests certified as FSC. FSC also includes a 'Chain of Custody' system that tracks paper from forest all the way to finished material. The 'Chain of Custody' requirement is what makes FSC particularly effective as the print buyer is able to trace the product back to the plantation and sometimes the immediate area in the plantation where the trees came from. It is crucially important if using the FSC logo that the 'Chain of Custody' has been carried all the way through the process from the forest, to the mill, the distributors, and the printers. The biggest misconception with FSC is that the printers don't need the certification. This is not true — every business which directly handles the paper requires an FSC Certification for the final product to be able to wear the FSC logo.
There are 3 types of FSC labeling:
FSC 100%
FSC Mixed Source — for products grouped from well-managed forests, controlled sources and recycled wood or fibre.
FSC Recycled — supporting responsible use of forest resources.

PEFC — Programme for the Endorsement of Forest Certification
PEFC is a non-profit making, non-governmental organisation. It provides a framework for auditing forestry operations and promoting sustainable forest management by actively reducing the effects on the environment. It is the largest certification scheme, covering 205 million hectares of the world's forest areas. It involves PEFC Chain Of Custody certificate holders (there are 3000 worldwide). Companies may hold both PEFC and FSC.

Papers that don't use wood fibres at all
There are a number of options available on the Australian market. The alternative fibres include: cotton, bagasse, bamboo, seaweed and hemp. The visual characteristics and print performance of these stocks are often indistinguishable from tradition wood based products.

Paper production facilities (paper mills)

ISO 14001 EMS
For a paper mill to have achieved ISO 14001 approval it must have established performance objectives and environmental management systems to prevent pollution, ensure compliance with regulations and achieve continual improvement. The ISO 14001 EMS standard specifies requirements for establishing an environmental policy, determining environmental aspects and impacts of products/activities/services. It can apply to any organisation producing any product or service anywhere in the world.

EMAS — European Eco-Management and Audit Scheme
A similar scheme to ISO 14001. EMAS is a voluntary environmental management system that is based in Europe and is developed around EU regulations. The scheme requires transparent public reporting, monitoring, auditing and employee involvement in its implementation. EMAS is designed to deliver continual improvements in a company's environmental performance.

Making the sheet white

ECF — Elemental Chlorine Free
ECF indicates a paper that is made without the use of elemental chlorine. ECF pulp is produced with chlorine compounds, a bleaching alternative that serves to reduce harmful by-products.

PCF — Process Chlorine Free
Paper that contains post consumer recycled fibre that was processed without the use of any additional chlorine or chlorine compounds.

TCF — Totally Chlorine Free
No chlorine gases are used in the bleaching process. TCF cannot apply to recycled papers, because the source fibre cannot be determined.

Carbon neutrality
Some mills have made their manufacturing process carbon neutral. To achieve this, a detailed carbon footprint analysis has been conducted and emissions significantly reduced through methods such as reducing energy requirements and utilising 'green energy' sources and finally, offsetting the remaining emissions through an accredited carbon offset scheme.

Most paper in Australia is environmentally friendly to some extent. The choice you make for paper will at some level be the right one for the environment.

The Australian Government has recently implemented a new legislation that targets the false representation of sustainability. Firms which make environmental or 'green' claims should ensure that their claims are scientifically sound and appropriately substantiated. Consumers are entitled to rely on any environmental claims you make and to expect these claims to be truthful. The Government has produced a paper entitled '*Green Marketing and the Trade Practices Act*'. View or download the paper from http://www.kainosprint.com.au/WhitePapers/GreenLegislation.pdf

Information for above section of the white paper has been obtained from KW Doggett, Raleigh Paper, CPI Paper, Spicers Paper and the Australian Government.

So . . . what paper should we be using?

Here are some choices you might make with explanations as to the environmental credentials of each choice. The papers on which KainosPrint.com.au's online pricing is based are Pacesetter gloss or silk and offset uncoated.

COATED PAPERS

Pacesetter gloss or silk (coated)

No recycled content
Lowest cost
Produced with ECF Pulp
FSC mixed sources certified
ISO 14001 Environmental accreditation

Monza gloss or silk (coated)

55% recycled content
Middling cost
Produced with ECF Pulp
FSC mixed sources certified

9Lives gloss or silk (coated)

80% recycled content
High cost
Produced with 20% TCF Pulp
ISO 14001 Environmental accreditation

UNCOATED PAPERS

Pacesetter offset uncoated

ECF — elemental chlorine free
Lowest cost
ISO 14001 accredited
Alkaline sized

Tudor RP (uncoated)

Australian made (the only one, out of this selection)
Recycled look — off white
100% recycled content
Middling-high cost
Produced with PCF Pulp
ISO 14001 Environmental accreditation

Envirocare (uncoated)

Recycled look — definitely off white
100% recycled content (75% post consumer and 25% pre-consumer waste)
High cost
Produced with ECF Pulp
ISO 14001 Environmental accreditation
Acid free

Impact (uncoated)

Bright white
100% recycled content
High cost
Produced with PCF Pulp
ISO 14001 and ISO 9001 Environmental accreditation
Acid free

HELPFUL DEFINITIONS

Elemental Chlorine Free (ECF) — pulp is bleached using processes that do not use elemental chlorine gas, reducing significantly the amount of toxins released.

ISO 14001 — the standard published by the International Standards Organisation specifying the requirements of an environmental management system.

Environmental Management System (EMS) — a business procedure that ensures that environmental matters are addressed through a documented system.

Totally Chlorine Free (TCF) — a pulp bleaching process that avoids the use of all chlorine.

Forest Management — these papers are totally derived from resources which are managed to ensure their renewability for generations to come.

Fully Recyclable & Biodegradable — environmentally friendly paper products which have no toxic constituents, and are recyclable.

Recycled Content — to obtain the Recycled label, a paper must contain recovered materials.

Alternative Fibre — paper containing alternate fibres such as Cotton linters, hemp etc.

Process Chlorine Free (PCF) — is made from recycled fiber that has not been rebleached with any chlorine based bleach.

Eco-Labels — eco-labels are seals or logos indicating that an independent organisation has verified that a product meets a set of meaningful and consistent standards.

Eco Bleaching Process — products that are bleached using chemicals other than chlorine gas. Eco-bleaching methods include Elemental Chlorine Free (ECF),Totally Chlorine Free (TCF),

Process Chlorine Free (PCF) — or products that are not bleached at all.

Manufactured Carbon Neutral — products for which the carbon emissions created during the manufacturing process are calculated, reduced and then offset however emissions 'from cradle to grave' are not assessed. The calculated footprint is therefore restricted to the manufacturing process within the mill gates only and does not include delivery to the consumer.

Certified Carbon Neutral — products that are certified carbon neutral by an independent third party and for which a complete life cycle assessment has been undertaken. The environmental impact of these products has been measured 'from cradle to grave' and a rigorous independent assessment of the carbon footprint accounting for the product has been undertaken and verified.

Renewable Energy — energy obtained from sources that can be naturally replenished. Current forms used by paper mills include solar, hydroelectricity (commercial and small-scale), biomass, wave and wind power.

These definitions have been taken with permission from Spicers web site. You can look these up at the following link http://www.spicerspaper.com.au/index.asp?menuid=100.020 where you will find links to the appropriate logos that can be used with the various types of printing.