

Making A Good Impression

Print buyers are becoming increasingly aware of the environmental impact of print. For the most part they understand that print is a more sustainable option than electronic media, but how do they decide which printing method to use? Is conventional offset more environmentally friendly than digital printing? Or is it the other way around?

A recent study commissioned by HP* used established life cycle analysis methodology to compare the environmental impact of printing eight page colour brochures on an offset press and a competing digital press.

The study found that at the economic break-even point of printing with the two presses, the carbon footprint of printing the brochures with the digital press is substantially lower than with the offset press tested. According to the research, the carbon footprint was “about 30% lower for the HP Indigo 7000 than for the offset press”; but unfortunately HP has chosen not to say which model of offset press.

Not surprisingly, the conclusion of the study is that “printing on the Indigo 7000 press is environmentally mostly preferable to printing on the offset press at economic break-even point.”

HP has obviously got its own objective with this work, which is to better understand the impacts of their press relative to offset. The white paper makes for interesting reading nonetheless. It’s increasingly clear that print, albeit for conventional or digital output, should be produced on demand to reduce waste. The report includes some important reminders, such as the fact that paper contributes 70% of the environmental footprint of print.

Treading Carefully

The problem of environmental footprinting is not simple and can be tackled from many perspectives. The HP study uses two key criteria: the economic break-even point and the environmental break-even point as the basis for its calculations. Most printers understand the economic

break-even point to mean the point at which the cost per print is the same for different output technologies.

The environmental break-even point is less well understood however, and refers to the point at which the potential environmental impacts per print are the same for either press. In this study environmental impact is calculated using a range of categories, such as global warming potential and water consumption, measured in low and high intensity usage scenarios for both presses. The idea of environmental break-even for print introduces a new metric for how we measure the performance of a press.

The basis for measuring both the economic and environmental break-evens is a US letter-sized piece of marketing collateral of eight pages printed both sides



HP's Indigo 7000 has been designed as a highly productive digital press capable of competing against litho presses at higher than average run lengths for a digital machine.

in full colour, with 60% coverage on 100# text glossy paper. According to the researchers, the economic break-even point for this job was 993 brochures and the environmental break-even point was around 3,000 brochures. However, the study found that this metric could vary hugely, from 614 to 34,442 brochures for the presses tested.

The economic break-even figure is incredibly high and many offset printers would dispute it, particularly those with modern offset presses capable of cost effective runs of as few as 200 copies. HP is not divulging the press model used in this work, just that the press was only

three years old. Also, it's difficult to draw conclusions about digital printers in general because productivity varies considerably from one model to the next, with the Indigo 7000 being one of the more productive of the electrophotographic presses. In any case, the numbers will inevitably vary with data sourced from different presses and production environments.

The data used for the offset press in this study was captured from a single test run of 2,211 B2 sheets printed simplex. The test run for the sheetfed offset press was made at California Polytechnic State University. As the report's authors state "the measured data ... represents a single sample of a process that can have important variability", so more test runs would have added to the strength of the argument. Capturing the performance data of several offset presses of a comparable crop as the HP Indigo 7000 would provide datasets that could be more reasonably compared.

The environmental break-even of around 3,000 copies suggests that for short run work a digital press has a lower environmental footprint. However the report states that "at sufficiently high job sizes, the impacts of offset will be lower than that of the Indigo 7000." With average print runs falling, the arguments for printing with a digital press are therefore compelling.

However, the data supporting the 3,000 figure is based on a single test run of an offset press, and it is for this reason that HP refers to potential rather than actual impacts. It would be interesting to see how the environmental break-even point changed if the HP Indigo 7000 were compared with, say, a Heidelberg Speedmaster with Anicolor or a Manroland Roland 700 DirectDrive.

Walking the Walk

The study, which was peer reviewed by a board including print experts and environmental scientists, is based on Life Cycle Assessment (LCA) principles and follows ISO guidelines for this type of work. LCA is used to evaluate the environmental impact of a product over its entire life cycle using data from various sources. HP provided comprehensive data for the HP Indigo 7000 based on multiple test runs of the test form on many

machines at many locations, specifically for this project. The press lifetime was estimated to be around six years.

An independent consulting company, Hal Hinderliter Consulting Services (HHCS), provided data for the offset press, based on a single press run. HHCS also provided information based on its own expertise regarding press

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lifetime, composition, utilisation and loss rates. HP's engineers used a lifetime of fifty years for the offset press as the base figure for calculations because, as the report acknowledges, an offset press can still be operational several decades after it was first commissioned.

For the Indigo 7000, HP gathered data from numerous sites and many, many presses. This has created a lack of balance in the test bases and data sets, and illustrates the need for comparisons of this nature to be balanced, with complete datasets for both areas of study.

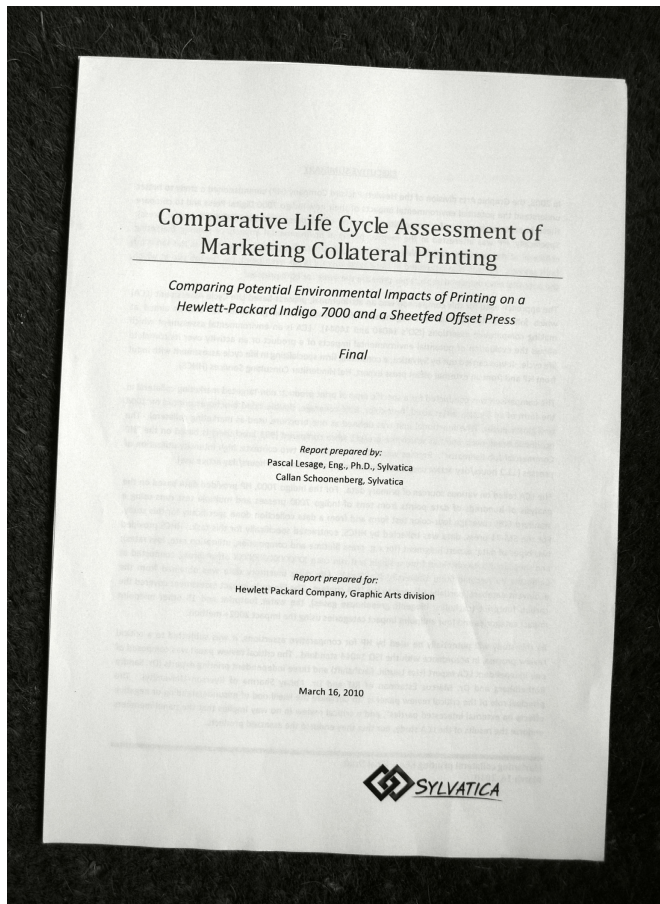
The more important point that comes through loud and clear in this study is that print produced in short runs on demand has a lower potential environmental impact. Printing longer runs of material that may be irrelevant for much of its target market has a negative environmental impact, because the print ends up being discarded as waste. Calculations for both presses were based on low and high press utilisations, running 4.5 hours per day for the former and 11.2 for the latter. This allowed the authors to model their data for different usage scenarios, and provides a useful framework for the data. In all cases short runs were more environmentally friendly.

The Process

The researchers used the same methodology as the Climate Group, an NGO working with governments to help implement climate change initiatives. Reference data came from Ecoinvent, the Swiss Centre for life cycle

inventories, which has a life cycle database including cradle to grave impacts for paper production.

As is clear just from the reference data, like for like comparisons are virtually impossible. However, it is vital in an academic study as comprehensive as this one to get



HP's report comparing an Indigo with an unnamed press has some useful points despite its flaws.

as close as possible. The report acknowledges the need for accurate data, and that inconsistencies can play havoc with the results, but the lack of data on the offset press skews its conclusions.

The study found that although offset printing has high fixed impacts it has lower steady-state printing impacts than the digital press. This means that for short run work, the offset press's impacts are higher. If the calculations were based on a press that used processless printing plates and waterless printing the numbers might be different. It's important to remember however that the process of plate manufacturing, rather than the coating and

processing chemistries, has the greatest environmental impact.

Printed Matters

The traditional economics of printing have dictated that excess is acceptable because it allows printers to exploit economies of scale and the expense of prepress and make-ready to reduce per copy costs. This model no longer applies because digital prepress is now highly efficient and competitive. Also the cost of waste is too high these days, both for financial and environmental impacts. In fact if one takes into account the waste, which can be substantial in some long run jobs, the cost per copy rises substantially.

With this in mind the report argues for a shift to new business models, or "business model re-engineering", using digital technologies to produce print on demand. According to the report, a model based around on demand production has the greatest potential for reducing emissions, throughout the printing industry since it produces only the printed copies that are required and so minimises waste. The model also strengthens the position of print on paper, when its environmental impact is compared to those of e-paper, electronic media and digital delivery of content, especially in office environments.

Next steps

HP commissioned this work in order to have some data it can use for comparative assertions and for benchmarking its own presses in order to improve them. Competitors from the offset world have however an easy counter: the research is robust, but the offset press data is totally insufficient and unrepresentative for a true comparison. HP should carry out more thorough research with a named offset press and be prepared to defend its data. That said, HP's data for the Indigo and the method used in this study provide an excellent reference for measuring the performance of different output technologies.

This report exhaustively covers the many factors to address for the comparison of environmental footprints of different technologies. Its flaw is that it relies on a limited data set. As a next step, we would like to see

a robust and fair comparison, in a controlled testing situation with both HP and a competitor sharing complete data on their presses. This gives the likes of Manroland, KBA, Komori and Heidelberg, as well as HP's digital press competitors an excellent starting point for coming up with some data of their own. Let battle commence!

Laurel Brunner 

* Comparative Life Cycle Assessment of Marketing Collateral Printing: Comparing Potential Environmental Impacts of Printing on a Hewlett-Packard Indigo 7000 and a Sheetfed Offset Press by Pascal Lesage, Eng., Ph.D. and Callan Schooneberg, Sylvatica. The study is available at www.hp.com/go/printlifecycleassessments