

Digital Printing Fighting for a Green Image

PRINT: Without the buzzword “Green Printing”, companies are less and less likely to order a print-job. Following the “Green Printing” trend, the suppliers of digital printing technology point at using less energy, as well as using less and more environmental friendly chemicals compared to classic offset printing. But when it comes to recycling, not everything labelled digital print is also “green”.

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In 2011, in Germany 22.7 million tons of paper and board were consumed – and 16 million tons came back to the paper mill, resulting in a recycling rate of about 71 per cent. Recovered paper is the most important raw material for the production. But this material is becoming more and more expensive, mainly due to the high demand from China buying paper for recycling all over the world. And not every printed product is equal when it comes to recycling. Newspapers shall be bright, graphic paper even more bright. For this reason, the printing inks have to be removed from the recovered paper, this procedure is called deinking.

“For that, at first the ink has to be released from the fibres, and then it has to be removed from the system”,

Axel Fischer, chemist with INGEDE, the International Association of the Deinking Industry, explains the two steps of the deinking process.

“There are colours where just one works without the other, for example water-based inkjet inks”, Fischer explains the problems about digital inkjet printing. These colours “can be easily removed from the fibres, but they stay in the system, because they are water-soluble. We cannot change the water all the time. It’s like the red sock in the washing machine.”

Before deinking, the paper has to be sorted. At first automatically, then manually. In the first step of the process, in a giant drum the sorted paper for recycling is being dissolved in warm water, some sodium hydroxide, and some sodium silicate – 1 per cent of paper fibres float in this sus-

pension, together with ink particles, impurities are removed.

The deinking process takes place in the two-loop flotation plant with soap being added. “Air is blown through it, and the foam carries all hydrophobic particles to the surface where they are removed. The hydrophilic particles stay in the solution and colour it”, Fischer says. Offset inks are hydrophobic, just as practically all dry toners. But most inkjet inks are hydrophilic.

With its Indigo machines, Hewlett-Packard (HP) is one of the leading digital printer manufacturers. They utilize a liquid toner that is transferred to the paper as a very thin plastic film. “In the recycling process, this film is torn into large flakes that are difficult to be removed in the deinking process”, knows Fischer. “They lead to coloured dots in the recycled paper.”

HP sees that differently. “Indigo prints are deinkable and recyclable”, claims Stephen Goddard, Environmental Leadership Program Manager, at the EcoPrint show, a fair for “green printing” that took place in Berlin in late September.

On the other hand, **Indigo is the first printing process ever causing a major damage in a paper mill.** In 2010, Cewe Color, Europe’s largest manufacturer of photo books, delivered a container with overprint from the photo book production to Steinbeis Paper, destroying almost a day’s production of recycled paper. The estimated damage is about 150,000 Euros.

“We thought we were doing something good”, says Matthias Hausmann, Cewe’s head of chemistry, process engineering and environment. “But **HP had not informed us about the problems in the deinking process.**” In the meantime recyclers have intensified their incoming inspections.

Cewe has 45 Indigo presses, also five more using dry toner (Xerox iGen4

Paper Recycling

- ▶ UPM’s Schwedt mill in Brandenburg uses only recovered paper for its production. From 120 to 125 kilograms of sorted paper for recycling, they produce 100 kilograms of newsprint paper.
- ▶ The mass difference consists of residues that have to be removed, e. g. printing inks and small fibre parts that have already gone through multiple recycling steps. These residues are used for energy generation in the mill’s power plant.
- ▶ For one ton of newsprint paper, this way 350 kWh are needed; with fresh fibres from wood it would be 2000 to 3000 kWh.
- ▶ The suspension with a fibre content of 1 percent is formed to a paper web on 200 meter long paper machines. The paper runs through different drying and calendering drums and rollers at a speed of 2 kilometers per minute, about 120 km/h. The whole passage takes about three hours.

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UPM's deinking plant in Schwedt: In giant flotation cells the printing ink is removed from the dissolved recovered paper. Foto: UPM

and Kodak NexPress). Every year they use more than 10,000 tons of paper, about half of it for digital prints, with about 15 per cent overprint. This now goes directly into corrugated board production – a classic form of downcycling.

Mail-order photo book printer Happy-Foto from Austria has discarded its Indigo presses “for economic and environmental policy reasons” – and replaced them by six Xerox Colorpress 1000, the company's owner and general manager Bernhard Kittel told VDI nachrichten.

John Cooper, Director Customer Support of Arjowiggins Paper, sees a solution: “In our deinking plant in Château-Thierry, south-east of Paris, we have three loops and a higher energy input. Even with 5 per cent Indigo input we achieved good results.” The Arjowiggins plant can produce 200,000 tons dry pulp from 250,000 tons of recovered paper.

Steinbeis Paper produces about 270,000 tons of recycled paper per year, both office and magazine grades. “Currently we don't have too many problems with liquid toner and inkjet prints. But too much Indigo, that is already more than 2.5 per cent, this spoils the whole production. And

yes, we've had that already”, says Andreas Steenbock, Technical Marketing Manager for Steinbeis, at the EcoPrint show. Steinbeis deinks since the mid-70s, since 2005 they run a plant with two loops for very high brightness grades.

Not every printed product is equal when it comes to recycling

With 4 million tons of recycled paper, UPM is among the world's largest deinkers. Wilhelm Demharter, Head of Environmental Projects, also sees problems with “many printed products from the new digital printing processes, that are very bad deinkable, such as flexo prints with water-based ink.”

In terms of printing technology, there are alternatives for inkjet based processes, such as dry toners. “Still 95 per cent of all digital prints come from laser printers – only 5 per cent from inkjets. But this is beginning to shift; the ink jetters become more popular and create problems for the deinkers” warns Lode Deprez, Vice President of Xeikon, a spin-off from

Agfa, producing printers that use dry toner technology.

The Japanese Fujifilm has a different concept. Before the actual printing a clear solution, a primer, is rolled onto the paper. The subsequently jetted inkjet ink coagulates, forming small dumplings, and thus is good deinkable.

The new digital press CiPress 500 by Xerox works with wax-based solid ink. At a resolution of 600 dpi it achieves a printing speed of 150 meters per minute. The first press in Germany has been installed at CW Niemeyer Printing in Hameln.

“The wax inks are melted and transferred onto the paper via a drum”, says Joachim Glowalla, CW Niemeyer's general manager. “These inks are perfectly deinkable.”

Sepiast from Klagenfurt in Austria has set up a research project together with INGEDE and offers water-based resin inks (Sepiast aquares). Here the inkjet pigment particles are to some extent covered with resin. “This ink is already in use at some Epson printers; we're working on solutions for Ricoh, Kyocera and Konica”, says Franz Aigner, Sepiast' general manager, for VDI nachrichten.

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