

## Keep Paper Recyclable!

Paper recycling is not as easy as it was. As e. g. in the UK still five million tonnes of paper are sent to incineration or landfill, the obvious political goal is to recover more paper. But this also requires more effort in keeping the recovered paper free from unwanted materials.

### Collect paper separately

Materials Recycling Facilities (MRF) mean a challenge as paper is collected together with other materials that are hard to be separated again. In Germany, the "Bonn Declaration" of paper industry, recycler and municipality organisations clearly voted

against mixing recovered paper with other materials. Experiences from the UK and France confirm this reservation: To achieve constant quality still a lot of effort is necessary.

### Digital challenges

A wide variety of new printing technologies with new ink compositions challenge a process that has been designed to remove offset and roto gravure inks. Even small amounts can spoil a whole load – ten per cent of pigmented ink jet printed paper are enough to ruin the production. Prints coming from HP's Indigo presses are even worse – they must be regarded as unrecyclable. Dry toner based inks do better (page 3). ●

## Who knows? We do!

### We are the experts in paper recycling – every day

Waterbased inks – that sounds good. It sounds good for the environment. But who knows that conventional waterbased inks – as they are used in flexo newsprint or in ink jet printing – cannot be removed in the flotation deinking process, the key process in our paper recycling?

Who knows that some digital printing methods are a serious problem for recycling? That certain glues in paper products cannot be removed in our plants? Instead they are leading to tacky depositions in the papermaking process, causing expensive production stops.

### Higher quality paper needs a higher quality raw material

INGEDE – the International Association of Deinking Technology – knows about all these problems. Because we together recycle almost ten million tons of recovered paper every year. We want to share these facts with you in order to reach our main target: to keep and improve the recyclability of recovered paper.

No glass, no cans, no milk cartons: In order to keep the high quality of recovered paper, it is necessary to collect recovered paper absolutely separate from other secondary materials! INGEDE even follows up the development of sorting techniques of collected mixed recovered paper, because quality issues are the driv-



*Dr. Ulrich Höke  
Chairman of INGEDE*

ing force for using recovered paper as fibre source in higher quality paper products, the only potential to increase recycling rates in Europe.

**RECOVER** will periodically inform you about technological improvements, trends and activities in paper recycling. In this first issue we want to tell you about **digital prints**, about exemplary **paper collection** in Switzerland with high ambitions (page 4) and about the „unknown“ recycling friendly **adhesives** (page 2). And about the **INGEDE Seminar** that we plan for September in London.

Recycling depends on the quality of recovered paper, because the higher the quality demands of the end product, the higher the quality of the raw material (the recovered paper) must be!

A high level of paper recycling has already been reached: Let's even try better for a sustainable future with paper recycling in Europe. ●

INGEDE

RECOVER



# Reactive Polyurethane Hot Melts – The Recycling Friendly Alternative

by Hermann Onusseit, Henkel KGaA, Düsseldorf

When the first reactive polyurethane (PUR) hot melt was introduced at DRUPA in 1988, the adhesive industry offered a genuine innovation for the graphic industry. Combining the extraordinary adhesion of polyurethanes with the high strength of their cured films, these adhesives allowed the printer to bind products which had been thought of as being non-bondable before.



The performance of books and brochures made with these new adhesives exceeded other binding systems significantly, so more and more customers asked for this technology. Today it has become a standard for highly stressed products like computer manuals, car manuals, or a ski atlas that has to be flexible and durable within a wide range of temperatures.

Reactive PUR hot melts consist of customised PUR pre-polymers with reactive terminal groups which connect under the influence of moisture from air or the paper substrate. The pre-polymers provide high adhesion which leads to excellent bonding to the sheet edges. After reaction with moisture, the cohesion of the resulting polyurethane film is the reason for the extremely high durability. Bonds are resistant to oils and solvents from printing inks, e. g., from the processing of sheet-fed offset prints. The combination of high adhesion and high cohesion accounts for the good aging resistance of books bound with PUR. Brochures made with PUR hot melts withstand cold and heat: even at temperatures

as high as 120 °C they stay strong, and they don't become brittle if they get as cold as minus 40 °C.

**Keep off the dryer:  
Compact films can be removed**

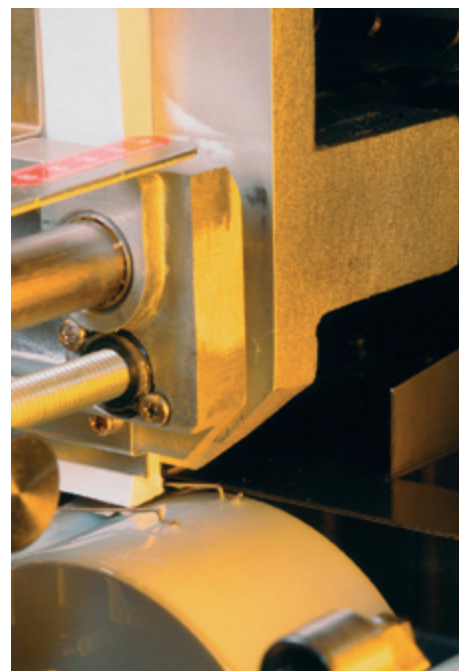
Extreme durability is the reason why PUR hot melts have no negative impact on the paper recycling process. The cured polymer films are retained by screens, even if they are only a few hundredths of a millimetre thin – they are stable enough not to be torn into small, unscreenable pieces. As they are not spread into the dryer section of the paper machine, the formation of stickies is prevented.

“These adhesives allowed the printer to bind products which had been thought of as being non-bondable before.”

Originally, reactive PUR hot melts were used for perfect binding only, while for the sides – the connection of the cover with the first and the last page of the brochure – thermoplastic hot melts were the choice. Compared to the backs, very little adhesive is used here and the adhesive films are usually very thin. In pulpers, however, high mechanical stress and temperature can break thermoplastics into small pieces that might enter the recycling process. PUR hot melts could replace thermoplastic adhesives in this application and provide more protection against contamination of the sensitive dryer sections in the paper mill.

## Recyclable applications available

Appropriate products and the necessary application technology have been developed. Binderies today can utilise a perfectly secure system to avoid weak connections or plasticizer migration both into the back and at the sides of their product. At the same time, they support recycling, especially of brochures that end up in recovered paper. ●



*PUR hot melt application*

## Recyclability is a Key to the European Eco-label for Printed Paper

Does an eco-label for printed paper make sense? Considered the huge variety of books, magazines or newspapers, can there be criteria to classify some of them “more equal”? The most important fact is that eco-labels are voluntary – and the applicant has to pay a fee for it. Products without label are not necessarily worse.

The eco-label for printed paper is a new product group and work is now underway led by the Swedish Competent Body, SIS Eco-Labeling in Stockholm. An ad-hoc working group with representatives from all groups involved discusses the EU eco-label for printed paper products.

Earlier versions of these criteria focused on low emissions for a product to be environmentally friendly. In the meantime “recyclability” was included into the draft criteria – because this is the most important parameter for a printed paper product to be recovered. The question is, how would deinkability be tested. INGEDE has developed a set of test methods that are already used in several paper research institutes in Europe.

The INGEDE Methods are available for download from INGEDE's website: [www.ingede.com](http://www.ingede.com)

More about the EU eco-label: <http://europa.eu.int/ecolabel>



Digital prints can be a nightmare for deinking. Pigmented ink jet inks contain very fine particles that cannot be removed – they lead to a more or less visible shade in the final product. Liquid toner as used in the HP Indigo process is even worse: It forms a thin, flexible film that passes all screens and leaves coloured specks.

Unlike other manufacturers, HP Indigo has not reacted to INGEDE's attempts to involve them into a group that discusses recyclability aspects of digital prints. Others, like Océ, Agfa, NexPress or Xeikon joined this group. RECOVER talked with Lode Deprez, Vice President of the Toner & Developer Group at Xeikon.

Why does Xeikon engage in recyclability of prints made with your products?

For Xeikon it is very important to offer complete and satisfying solutions to the customer. The environmental impact of our digital printing technology is very important, it has also become an important marketing instrument. We already received environmental awards for this policy.

Why does Xeikon opt for dry toner?

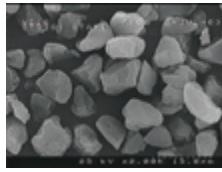
We have investigated printing technologies with respect to performance, reliability, printing speed, printing quality and environmental impact (both during and after printing). We came to the conclusion that dry toner is still the only technology that fulfils all these requirements. Especially when it comes to high quality, high speed printing, the use of dry polyester based toner particles is still unbeaten. Xeikon is not the only company that chooses this technological path. Many of our competitors (Xerox, Kodak, NexPress, Canon and others) also are using this toner technology.

What is chemical toner?

The toner which is most widely used for printing and copying machines is made by special milling and classifying technologies ("crushed" toner). It takes a lot of special know-how to make small 6 to 10 micron

## Why Dry Toners Do It Better – Especially If You Control What They're Doing

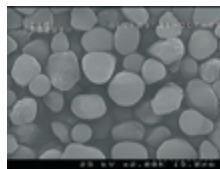
Interview with Lode Deprez, Xeikon International NV, Lier (Belgium)



large particles out of dedicated polymers. In recent years chemists from different companies have developed methods to produce toner particles under controlled conditions in a liquid. The chemists "grow" the toner particles until they have reached the right size. This is generally more expensive, but offers also several advantages.

What are the advantages of chemical toners?

It gives an extra dimension towards toner design, leading to a more simple hot roller fusing system which requires less maintenance. It also results in more rounded toner particles which have some benefits with respect to transfer efficiency and reliability. This advantage is not unique for chemical toner, because also the crushed technology has been catching up and is now also perfectly able to produce round or potato shaped particles.



A third advantage comes 100 % on the account of the desktop engine manufacturers who have a better control on the "white product" aftermarket activities. This aftermarket business at this moment is not equipped to produce this kind of toner, which gives the OEM suppliers an enormous time advantage.

Does chemical toner affect the deinking process?

Not necessarily. As long as the chemical composition and physi-

cal behaviour (like brittleness) are like "crushed" dry toner, then there should be no problem. But if you e. g. lower the melting temperature, the particles might form elastic aggregates under the conditions of the deinking process. These aggregates are very difficult to remove.



Do adhesion and recyclability mean a contradiction?

No, polyester toners are compatible with a lot of substrates like paper, board, aluminum foil, or polyester foil. On paper, this system does not give any problem with deinking. Sure the printer industry wants to increase the adhesion to the substrate. But in the meantime we have learnt a lot about fusing conditions. We manage a sufficient adhesion of the toner particles to the paper without them penetrating into the fibre. So they will easily come off in the deinking process. This has been shown in a series of tests in cooperation with INGEDE.

For more about the deinking of digital prints see [www.ingede.com](http://www.ingede.com)





## Deinked Pulp for Graphic Paper

Paper production and consumption have constantly grown in the last decades. As the amount of recovered paper in classic grades (news and board) can not be increased any more, the role of recycled fibre material for higher printing paper grades gets more and more important. Representing the deinking paper mills, INGEDE tries to maintain the quality of their most important fibre source. At a CEPI Workshop about "Paper and Board Collection Systems in Europe" in Pisa (Italy), Stefan Endras of Utzenstorf Paper (Switzerland) shared the "Swiss experience" about separate collection of graphic paper and board.

Paper production and consumption will grow further. The collection has to follow the increasing demand of recovered paper. Increased collection and utilisation rates above today's level will only be possible if recovered paper is collected in suitable qualities and in cost efficient ways.

### Collect more paper! Why?

In total, Switzerland in 2003 consumed little more than 1.61 million tons of paper and board. Compared with 1.13 million tons collected, this results in a collection rate of 69.9 per cent. The utilisation rate (the fraction of recovered paper used in the total production) is 58.3 per cent.

But there are simple reasons to collect more:

- **Economic reasons** – as long as the use of recovered paper is not more expensive than the use of virgin fibres, recovered paper will always be the most important fibre material.
- **Ecological reasons**, as the use of recovered paper is energy efficient and one main problem of municipalities

is the need to find environmentally friendly ways to utilise the recovered paper they collect from households.

- **Technical reasons** – to maximize the utilisation rate suitable qualities and quantities have to be provided.

The use of recovered graphic paper has potential to grow in graphic paper and in folding boxboard.

### Collect paper and board separately!

For Switzerland, more ambitious collection goals seem achievable: The Swiss Environmental Agency has analysed the composition of municipal waste that went to incineration plants. They found that there are still fractions of paper (16 per cent) and board (4 per cent) in the municipal waste. Not all of these could be recycled, there are some limitations because of contamination, e. g. with food. But extrapolations showed that a potential of 71,000 tons could be diverted from mixed household waste to separate paper and board collection.

The theoretical collection rate could rise from today's 69.9 to about 74 per cent. To achieve this goal, paper and board have to be collected separately. Especially where paper and board are already collected separately from garbage, the separation of the paper (newspapers and magazines) and board fraction (mostly corrugated board) could lead to higher cleanliness.

We want to use as much recycled fibre as possible. But for the paper mills it is a difficult task: to use more recovered paper, to fight more impurities and at the same time meet the rising demands of its customers, the graphic industry – for higher brightness and higher paper value. ●

**INGEDE** The International Association of the Deinking Industry was founded in 1989, first with the target to support the voluntary agreement in Germany upon graphic paper recovery rates by its expert knowledge.

In the following years INGEDE consequently developed to an European expert association on deinking technology and recyclability of graphic printed products, today supporting also the voluntary declaration of European paper chain associations with ambitious recycling rates in Europe. Currently 37 European deinking paper mills and research departments are members of INGEDE, representing today almost ten million tons of recovered graphic paper.

## WANTED: The Paper Chain

Come to the annual **INGEDE Seminar Recyclability** on September 13, 2005 in London, from 10:00 to about 16:00 hrs. If you are an active member of the paper chain as a publisher, printer, recycler or member of their associations or if you work for a paper mill and are interested in the work of INGEDE, you are welcome to be our guest!

This year's topics include:

- Paper Recycling in Europe and in the UK
- Recovered Paper Quality
- Deinked Pulp (Benchmarking Results)
- Recyclability of recovered paper (Problems with flexo and digital prints)

More information on INGEDE's web site [www.ingede.com](http://www.ingede.com) or by e-mail.

INGEDE will hold a **press conference** on June 14, 2005 at **SPCI2005** in Stockholm.

The next **INGEDE Symposium** will take place on Thursday, January 26, 2006.

## International Association of the Deinking Industry

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81373 Munich, Germany

Printed in Denmark on

CyclusOffset 115 g/m<sup>2</sup> by Dalum Paper

made of 100 % recycled paper

This paper product is good recyclable according to INGEDE's test methods.