

The Deinkability of Flexo Prints

Flexographic Printing is a promising technology. It is fast, clean and looks cost saving – in the first place.

But currently flexo inks are **not deinkable together with standard offset news and magazines**. Flexo ink particles mix with water, they are **hydrophilic**. The binder of these inks dissolves in the alkaline environment of the pulper, the first step of the recycling process in the paper mill. Then the ink particles are released into the circulation water. They are not removed during the flotation. Alkaline pulping and flotation are designed to remove **hydrophobic** particles like offset or gravure inks. The flexo ink particles attach to the hydrophilic fibres and lead to a significant grey shade of the recycled paper. **No customer would accept this product.**



Flexo newspapers can also spoil a load of off-set news and magazines. The results below show different deinking experiments (for description of the experiment see reverse).

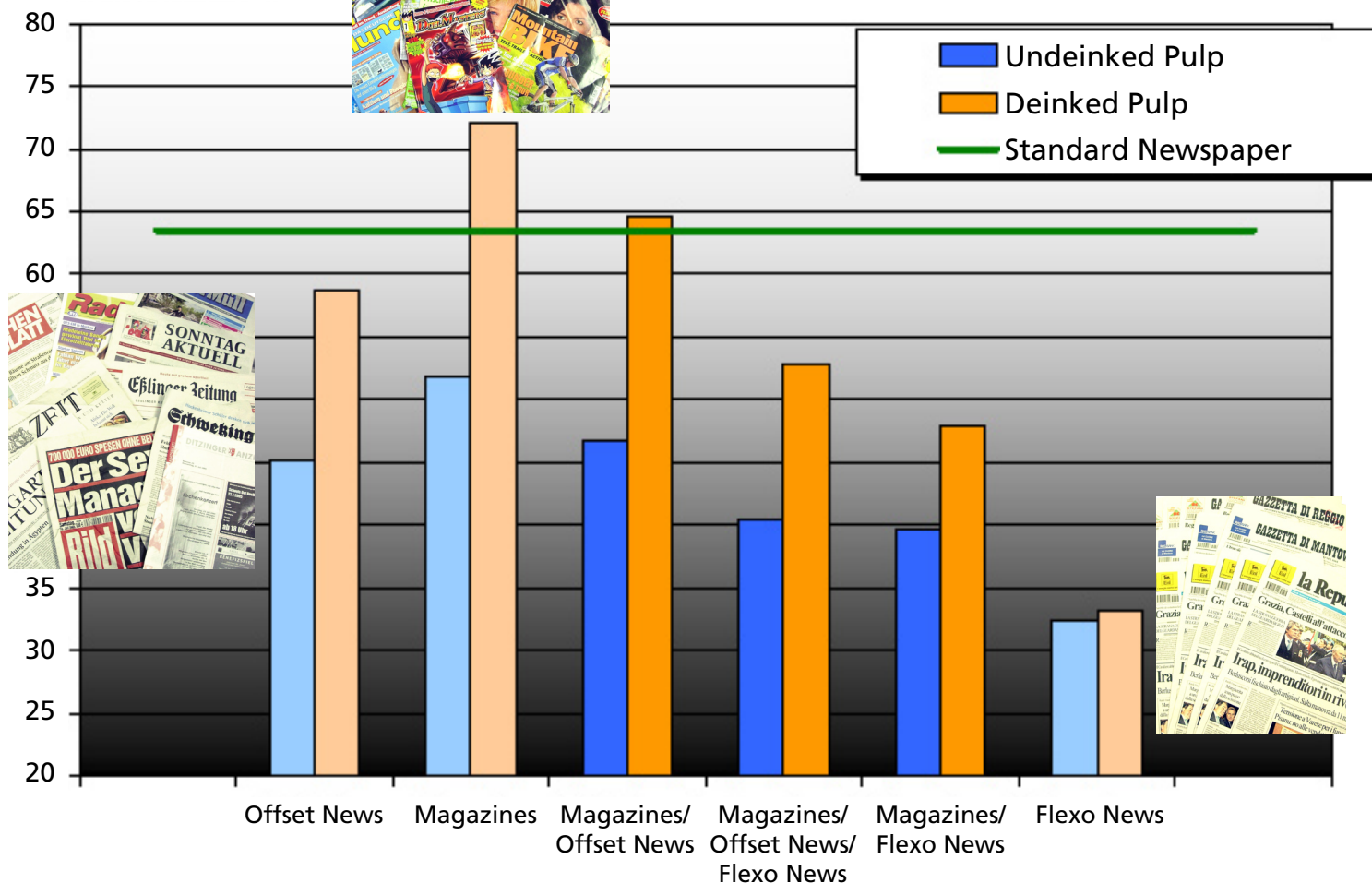
Newspapers are already printed on recycled paper. This is why pure newspapers, when deinked, do not reach the brightness targets for newsprint again. Magazines, printed on fresh fibre paper that usually is also thicker than newsprint, lead to a much brighter pulp after deinking.

Reality is a mixture

In paper mills, there are always mixtures to process. The standard deinking grades consist of about half magazines and half newspapers. Flexo newspapers are excluded in the specification for recovered paper for deinking. The experiments below show the reason: Even a mixture that contains 25 per cent flexo newspapers, the flexo portion leads to a **poor deinking result**. With pure flexo news, the deinking process has hardly any effect.



Luminosity (Y-Value) [%]



Testing the Deinkability of Paper Products

How do you decide whether a paper product is deinkable? Not only flexo printed newspapers, also other printed products can be difficult to recycle. The key processes during paper recycling are the pulping and flotation, the detachment of the ink from the fibres and the separation of ink particles from the fibres with the help of soap. To find out whether a printed product is deinkable in this flotation process, INGEDE and leading paper research institutes have developed several test methods. Here **INGEDE Method 11 "Assessment of Print Product Recyclability – Deinkability Test"** is applied to the different mixtures of newspapers and magazines.



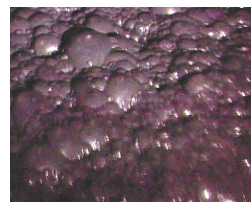
Test Procedure

The samples are stored at 60 °C for three days to simulate ageing – the storage between the date of print and the recycling process can influence the deinkability of a printed product.

The aged sample is torn into small pieces. About 200 grams are necessary for the following test procedure. A Hobart pulper, looking similar to a kitchen mixer, is filled with the paper pieces and a solution of sodium hydroxide (caustic soda), sodium silicate and oleic acid (a detergent). Then some hydrogen peroxide (to serve as a mild bleach) is added, and the mixture is disintegrated for 20 minutes.

After some storage time to allow for the chemicals to perform their work, the fibres are homogenised, then diluted with water to terminate all chemical reactions.

In a laboratory flotation cell, air is bub-



bled through the mixture. This air together with the soap creates foam. While passing through the diluted pulp, the bubbles collect hydrophobic particles – the ink –, helping them to “escape” from the water to the surface. The foam is skimmed off.

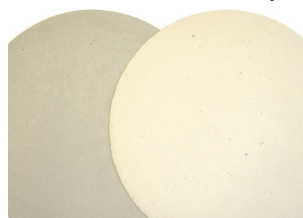
After sufficient flotation, the fibres are filtered off. The dissolved undeinked pulp and deinked pulp is taken, each is sucked through a filter paper, then dried.

The result are two filter pads that allow to define the efficiency of the deinking process.



Poor results with flexo prints

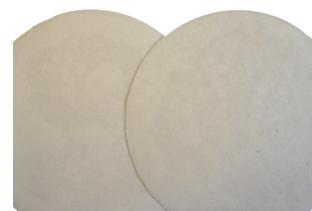
For deinked newsprint (above) and magazines (left), the filter pads after flotation look quite bright. For current flexo news, there is almost no visible effect (below).



An industrial trial with flexo prints in 2005 showed that it is possible to achieve the desired brightness with 15 per cent flexo news in the mixture, but at lower yield, with more energy and high amounts of bleaching chemicals.

New experimental inks

XSYS Print Solutions recently tested an ink with **promising properties** – a binder insoluble in alkalines and more suitable for flotation. As **current flexo newspapers cannot be deinked** in the mixture under economical conditions, new investments in flexo printing have to be accompanied by continuous development of a deinkable flexo ink. If newsprint cannot be produced from recovered paper with **reasonable effort**, fresh fibre has to be used, the paper price might rise – and newspapers might not be the **sustainable product** of today any more.



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