



Paper, Paper Products & Recycling (Better product design to close the loop)

Barry Read
PITA
5 Frecheville Court
Bury
Lancashire (BL9 0UF)

Andreas M. Faul
INGEDE e. V.
Gerokstrasse 40
74321 Bietigheim-Bissingen
Germany

Abstract

Graphic papers (predominantly Newsprint and Magazines) collected from households are by far the most important raw materials for recycling by means of deinking in Europe. In addition to these main components the collections often contain certain quantities of higher-grade papers (copier and office papers) originating from mailings, transactional and SOHO prints. Among these print products, digital prints and particularly inkjet already contribute a significant proportion and this will increase in the future.

The ability to recycle these materials depends mainly on the characteristics of the inks and therefore on the printing process. Flotation deinking, the dominant process, was developed to remove simple letterpress and rotogravure inks and it also works well on mineral oil based offset inks. There are certain analogue printing technologies that do not fit well with current ink removal techniques; such as water-based flexographic printing, Cured Printing Inks or Digital Printing.

- With Flexographic inks currently in industrial use the ink particles are too hydrophilic and too small for an efficient removal by flotation. The unremoved ink particles result in a grey shade in the pulp after deinking and accumulate in the process water.
- Cured Printing Inks, such as UV Cured, present a different challenge. In many cases, the ink does not detach sufficiently and forms agglomerates that are too large to be effectively removed in a single stage flotation process, resulting in visible dirt specks in the final pulp.
- In digital printing, the different printing technologies perform totally different in the flotation deinking process. Dry toner prints are generally easy to deink, Liquid toners inks have not shown any acceptable results so far (except in one specific deinking operation). The ink film is extremely robust and does not fragmentise into the small particles necessary for deinking. Due to their flexibility, their ability to float is somehow better than the rather stiff UV cured particles; yet in the majority of cases currently investigated, the remaining toner particles are too high for the required cleanliness of deinked pulp.

Due to their forecast increase in market share, inkjet printing receives most attention in investigation and testing work. Early inkjet prints did not show any good results. They behave very similarly to water-based flexographic prints. As research and development work continued, more and more recyclable (deinkable) inkjet prints were discovered. There is a clear picture that dye based inks on standard papers have the worst deinking performance. Pigment based inks perform somehow better, but still not sufficient. Good deinkability results can be seen with special inks or treatment of the paper surface – either already in papermaking or prior to printing. The challenge here is to find cost-efficient systems which will be accepted in the market.

Creating recyclable products is in the responsibility of the producers. Collection and trade of paper for recycling are not key players for this parameter. However, in cases where non-deinkable products can be identified, they should be separated or kept separate and not blended into grades intended for deinking.

Keywords

Paper recycling, INGEDE, digital printing, deinking, deinkability, inkjet, flexographic printing