

**21st INGEDE Symposium
8 February 2012 in Munich**



INGEDE

**International
Association of the Deinking Industry**

INGEDE's Research Projects

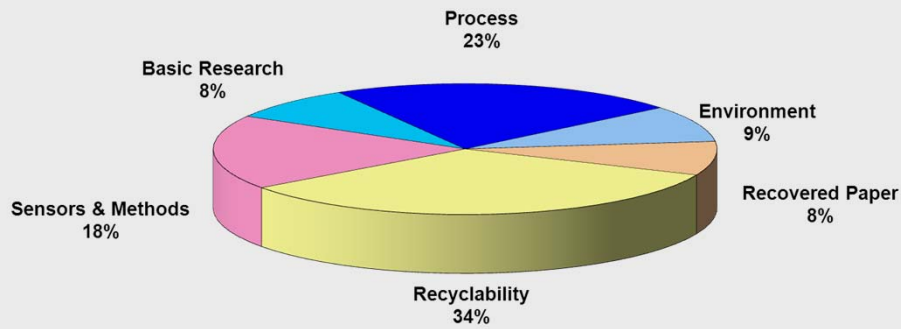
Dr Peter Engert, Andreas Faul, Anne-Kathrin Kuna

INGEDE's Research Concept



- Sponsoring different research programs which are dealing with recyclability issues of RCP **mainly focused to deinkability of various printed products.**
- **Development of methods** and evaluation tools **in the frame of the ERCP** to maintain and/or improve **the quality of deinked pulp.**
- **Currently research projects** support mainly the development of the new generation of printing technology.
- INGEDE encourages **involvement** of further stakeholders in the **paper value chain** whenever appropriate.

Expenses for 135 research projects in 23 business years – 6 483 000 €



Projects finished in 2011 and current projects

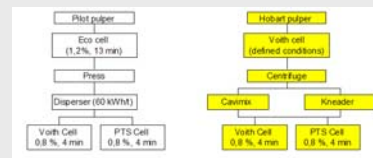
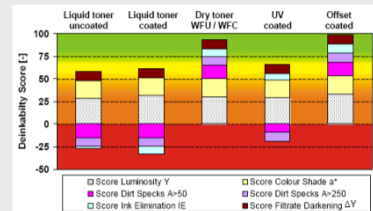


N°	Project	Institute(s)
114 06	Flexo task force – multi client, on hold – flexo printers in UK and IT do not use improved inks	CTP
130 09	Process oriented deinking of prints with cross-linked inks in laboratory scale – extension of project in progress	PTS
132 10	Deinking potential of recovered paper depending on water circuit quality	CTP-PMV-PTS
133 11	Recyclability 2011 – 49 deinkability tests, some for certificates, some with additional tests – 3 recyclability tests – paper cups, barrier coating	TU Darmstadt, PTS
134 11	Inkjet Study – with DPDA; in progress	CTP
135 11	Adsorption Deinking	TU Dresden

Deinking of prints with cross-linked inks in lab scale (130 09)



- Potential of various process steps on prints which are difficult to deink.
- The test run will be focused to UV cured printed products which fail the dirt speck limits.
- Various paper grades (WFC, SC, LWC) are under investigation.
- Lab method will be tested to simulate a 2nd loop deinking process.
- The comparison will be done with a simultaneous run on a mill scale relevant pilot installation.



Basic inkjet study together with DPDA (134 11)



- Creation of common baseline data for the deinkability of various printed papers
 - Collected on papers printed with pigment inks at DPDA member sites
 - 6 different papers (*high quality recycled uncoated*, *woodfree pigmented*, *woodfree coated inkjet*, *improved newsprint*, *standard newsprint*, *LWC*)
 - 4 pigment ink sets from the DPDA members will be tested
 - To result in 24 different ink-paper combinations.
- Deinking tests will be done by CTP
 - Test procedure is based on INGEDE Method 11 with anonymous marking of the samples
 - Samples will be evaluated by ERPC deinkability score



Evaluation of Deinkability
Good
Fair
Poor
Not suitable for deinking

New Projects and Project Proposals for 2012



N°	Project	Institute(s)
136 12	Recyclability 2012	
(proposal stage)	Recycling friendly varnishes – with further stakeholders of the paper value chain	PMV
(proposal stage)	Monitoring of varnished printed products with NIR spectroscopy	PTS
(in preparation)	Removability of adhesive applications (extension of database) – with further stakeholders of the paper value chain – follow-up of INGEDE Project 129 09	PMV

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Selected non-INGEDE research projects (funded by third parties)



N°	Short title	Institute(s)
bifa	Paper for Recycling: A project for cooperation along its path to optimise and support the material loop	bifa
IGF 15758	Recyclability of UV printing inks	FOGRA
IGF 16025	Reduced energy input through modified deinking process design by fractionation	PTS
IGF 16709N	Measurement of stickies with fluorescent dye	PMV
INFOR 155	Reducing mineral oil in food packaging	PMV, PTS

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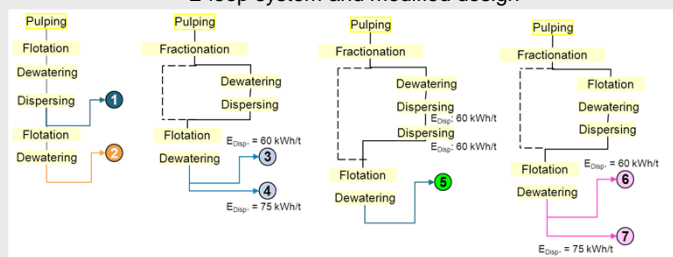
Research project IGF 16025 (PTS)

Reduced energy input through modified deinking process design by fractionation (1)



- **Objective**
- Save energy during stock preparation and preserve DIP quality
- **Approach**
- Fractionation before pre-flotation
- Dispersing of long fibre fraction
- Improving the ink detachment by dispersing
- Abandon 2. flotation stage
- **Material**
- grade 1.11, wood containing and woodfree recovered paper, undeinked pulp

2-loop system and modified design



Source: E. Hanecker: IGF 16025

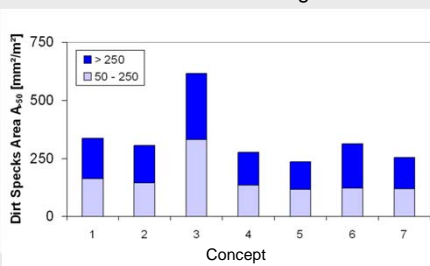
Research project IGF 16025 (PTS)

Reduced energy input through modified deinking process design by fractionation (2)

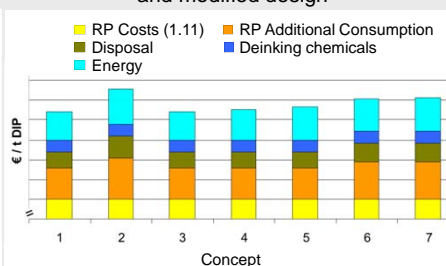


- **Key results for fractionation and dispersing compare to 2-loop system**
- Brightness levels achieved are slightly lower
- Dirt speck particles < 50 μm are equally effective removed, > 250 μm remain more problematic
- Losses are smaller and therefore costs are reduced

Dirt specks area for 2-loop system and modified design



Costs for 2-loop system and modified design



Source: E. Hanecker: IGF 16025

Research project IGF 15758 (Fogra) Deinkability of UV cured inks (1)



• Objective

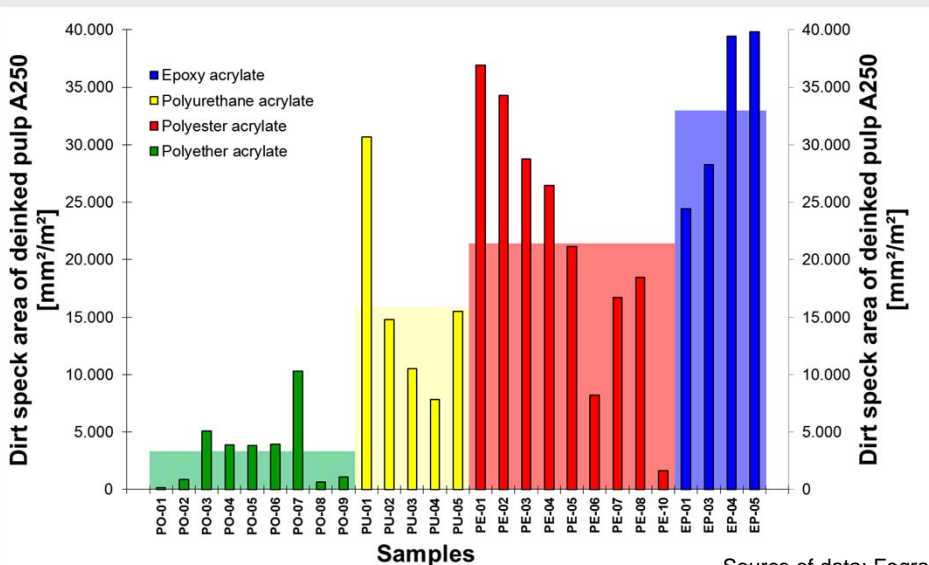
- Investigation of reasons for different deinkability of UV cured prints

• Approach

- UV inks with different binder chemistry
 - Model inks with one acrylate (pre-polymer) for each ink
 - Reactive diluents, photo initiators and pigments were the same for all model inks
- Test prints
- Laboratory deinking tests
(INGEDE Method 11p with reduced sample weight)
- Main criteria: ink elimination and dirt speck area

Source: Fogra

Research project IGF 15758 (Fogra) Deinkability of UV cured inks (2)



Source of data: Fogra

Research project IGF 15758 (Fogra) Deinkability of UV cured inks (3)



• Key results and relevance

- General ranking of deinkability from good* to bad with
 - Polyether acrylates
 - Polyurethane acrylates
 - Polyester acrylates
 - Epoxy acrylates
- Market inks for UV offset printing are usually a blend of different acrylates
- Main criterion for use are the desired properties of the application
- Deinkability is better with hard and brittle ink films than with soft and flexible films
- Fogra defined “critical dirt particle size” as helpful auxiliary parameter (= mean particle size of dirt specks above 250 µm)

* Only one result passes the threshold for large dirt specks

• Follow-up project

- Influencing the ink polymerisation in order to improve deinkability

Source: Fogra

Research project IGF 16709N (PMV) Measurements of stickies with fluorescent dye



• Objective

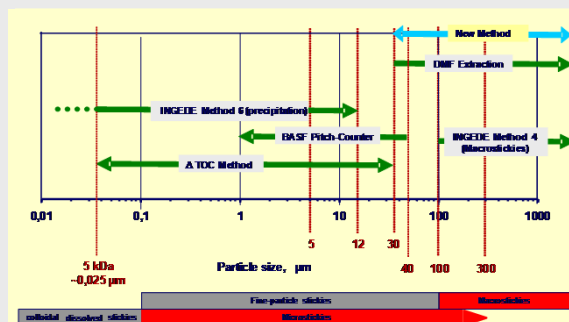
- Development of a “simple”, fast laboratory method for simultaneous measurement of micro- and macrostickies

• Approach

- Labelling of hydrophobic particles with fluorescent dye
- Analysing a laboratory handsheet
- Image capture with CMOS camera equipped with UV LEDs

• Criteria:

- Figure out the appropriate fluorescent dye
- Procedure of dye application (in suspension, impregnate, spray)
- Detection and exclusion of faulty labelled particles
- Adaption of image analytic software



On-going project – most promising!

Source: D. Voß

Research for a sustainable paper chain



- **Printed products** are **sustainable products**.
- They are a **system** of paper, ink, varnish and adhesives.
- A new product has to **match the process** dealing with the majority of all paper products.
- The **methods developed by the paper industry** together with **partner research institutes** help to rate and manage the raw material.

Only a **joint effort** can keep paper recycling an **ecologically and economically sustainable** process.



Thank you for your attention!