

21st INGEDE Symposium

INGEDE Project 135 11 "Adsorption Deinking"

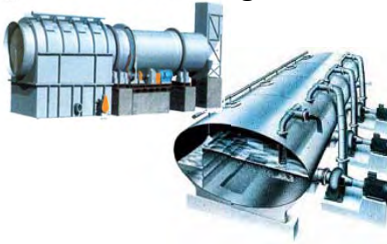
T. Handke u. H. Grossmann

Munich, 8.2.2012

paper for recycling

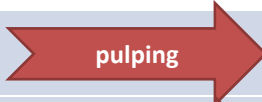
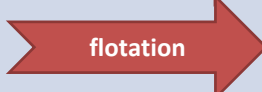


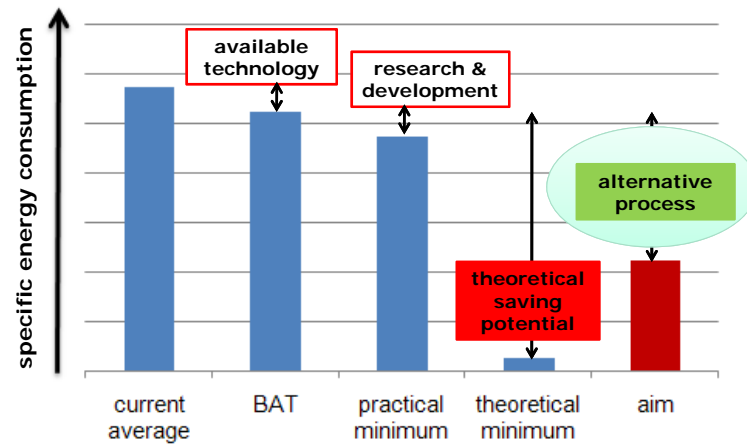
deinking



deinked pulp



		SEC kWh/t	
		state-of-the-art	theory
fiber separation		30	10 ⁻³
ink detachment			10 ⁻⁴
ink displacement		50	10 ^{-4*}



Objectives

- Development of alternative concepts (adsorption deinking) which should show
 - comparable results as far as stock quality is concerned
 - significant reductions in specific energy
- **Verification at laboratory scale**

Genesis of the idea

- Novel cleaning method developed for the textile industry.
- Certain polymers extract dirt and other hydrophobic components out of fabrics and accumulate them on their surface.
 - Polymeric beads serve as „dirt catcher“
 - 90 % water saving
 - 30 % reduction of operational costs

Expected benefits as compared to state-of-the-art technology

- Much higher consistencies during ink removal result in significant energy savings
- Friction between beads and paper support both pulping and dispersing and might even allow for a combination of these tasks in just one process
- Appropriate separation processes would significantly reduce fibre losses – or make them controllable



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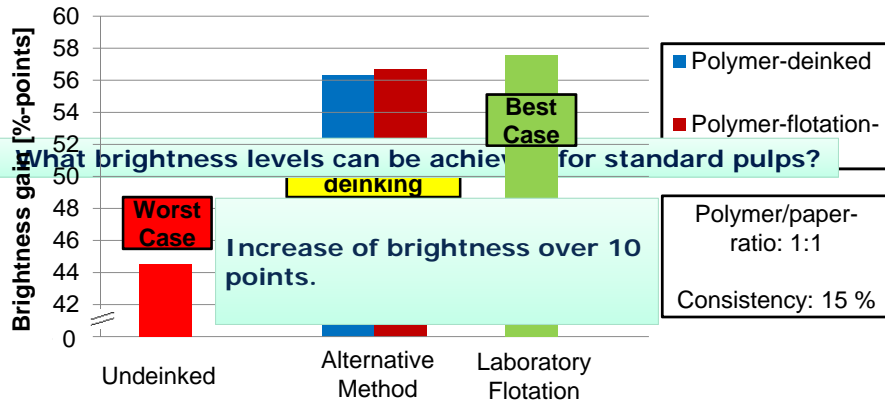
Results



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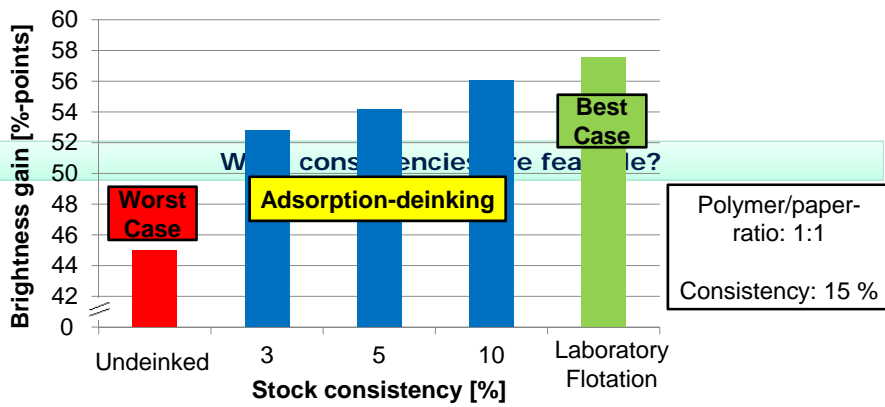
Comparison of methods



Increasing stock consistencies support ink attachment.

Consistencies above 10 % are particularly suitable.

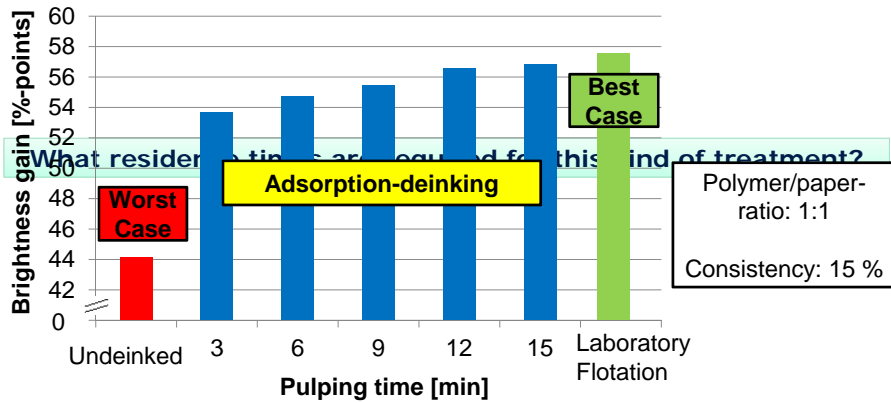
The influence of stock consistency



Increasing pulping time support ink attachment.

15 min are sufficient.

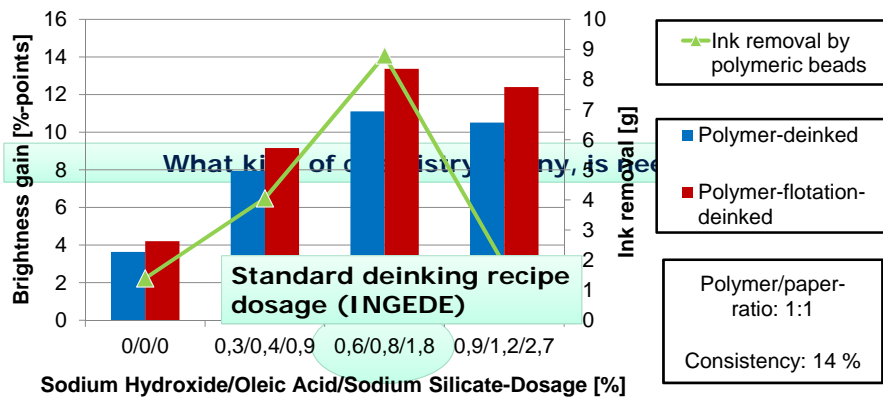
The influence of pulping time



Increasing chemical dosage support ink attachment.

Best results at standard deinking recipe dosage.

The influence of added chemicals



- Standard deinking chemistry is suitable for adsorption deinking
- Increasing
 - stock consistencies,
 - pulping time and
 - amount of polymeric beadssupport ink adsorption.
- But there are optimum operation conditions
- No negative influence on strength and other pulp and suspension properties (Fiber-Lab, E (SR)).

- Best results:
 - 15 % stock consistency
 - polymer/paper ratio of 1:1
- Increase in brightness of 10 %-points.
- Clear reduction of dirt specks.
- Mineral oil analysis:
 - Discharge of approx. 75 % of all mineral oil components
 - Comparable with usual laboratory flotation

- A subsequent flotation render only a slight improvement
- Adsorption deinking achieves nearly the results of laboratory flotation
- Pulping + Dispersing + Deinking in one process step
- Much lower (or much better controllable) fibre losses

- Investigations with respect to the
 - cleanability as well as the
 - reusabilityof the polymeric beads. (IGF project)
- Investigations on how and where the loaded polymeric beads to should be separated from the pulp (ZIM project)
- Possibility of combining deinking and dispersing in one process step (INFOR 161)
- Assessment of the performance and suitability (adsorption capacity, separability etc.) of other polymers (IGF project).

Thank you very much
for your attention

Toni.handke@tu-dresden.de
Harald.grossmann@tu-dresden.de

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Adsorption deinking – the procedure



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3. Results and discussion

Mineral oil analysis:

