Eco Design for the Enhancement of Central Europe
Paper Based Products Recycling Loop

Deinkability of graphic products – news and results

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Krakow, 03 December 2014

Why Deinking?

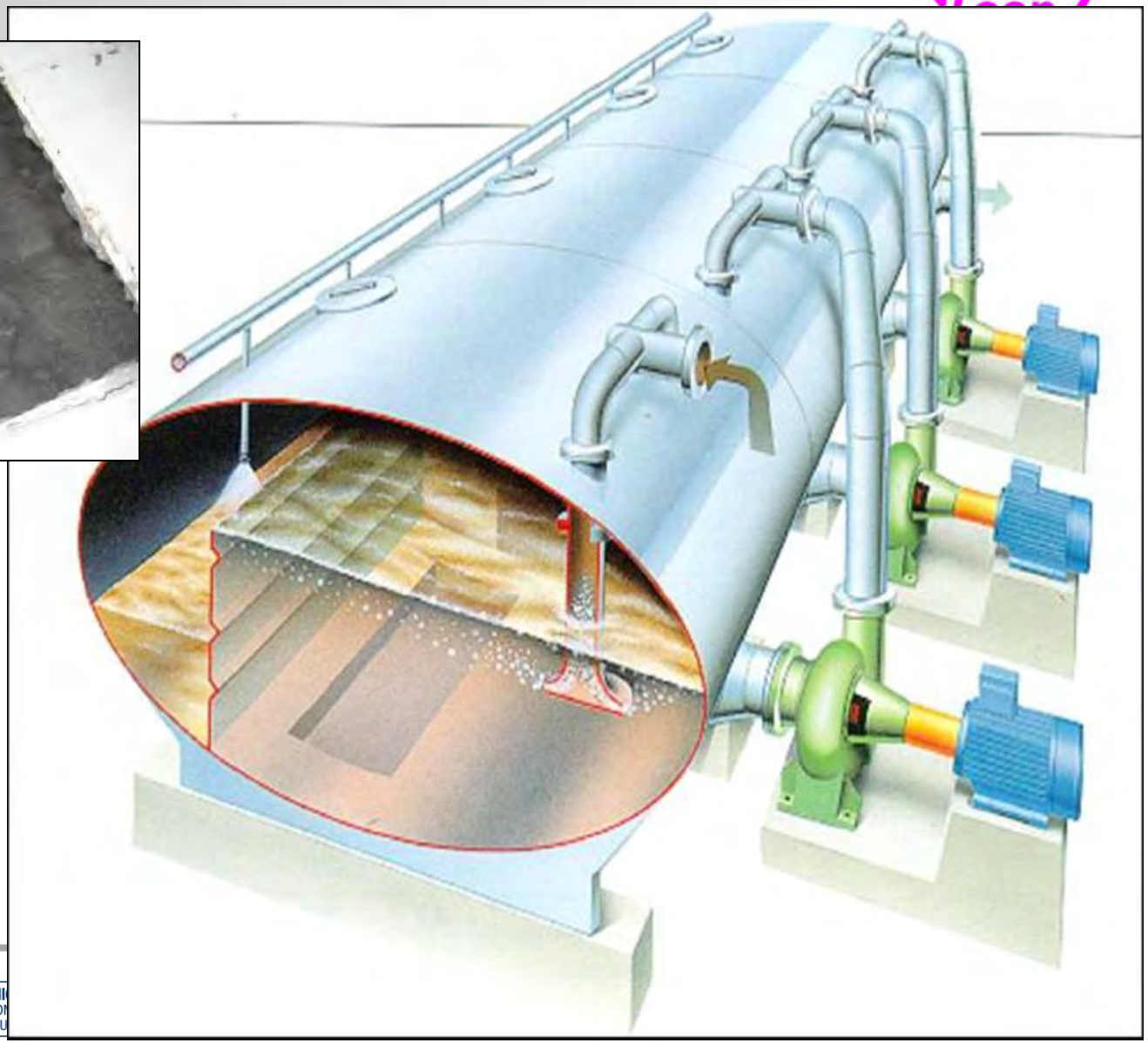
Principal process steps in a deinking plant

Flotation

Screening and cleaning

Pulping

Flotation deinking



Basics of deinking

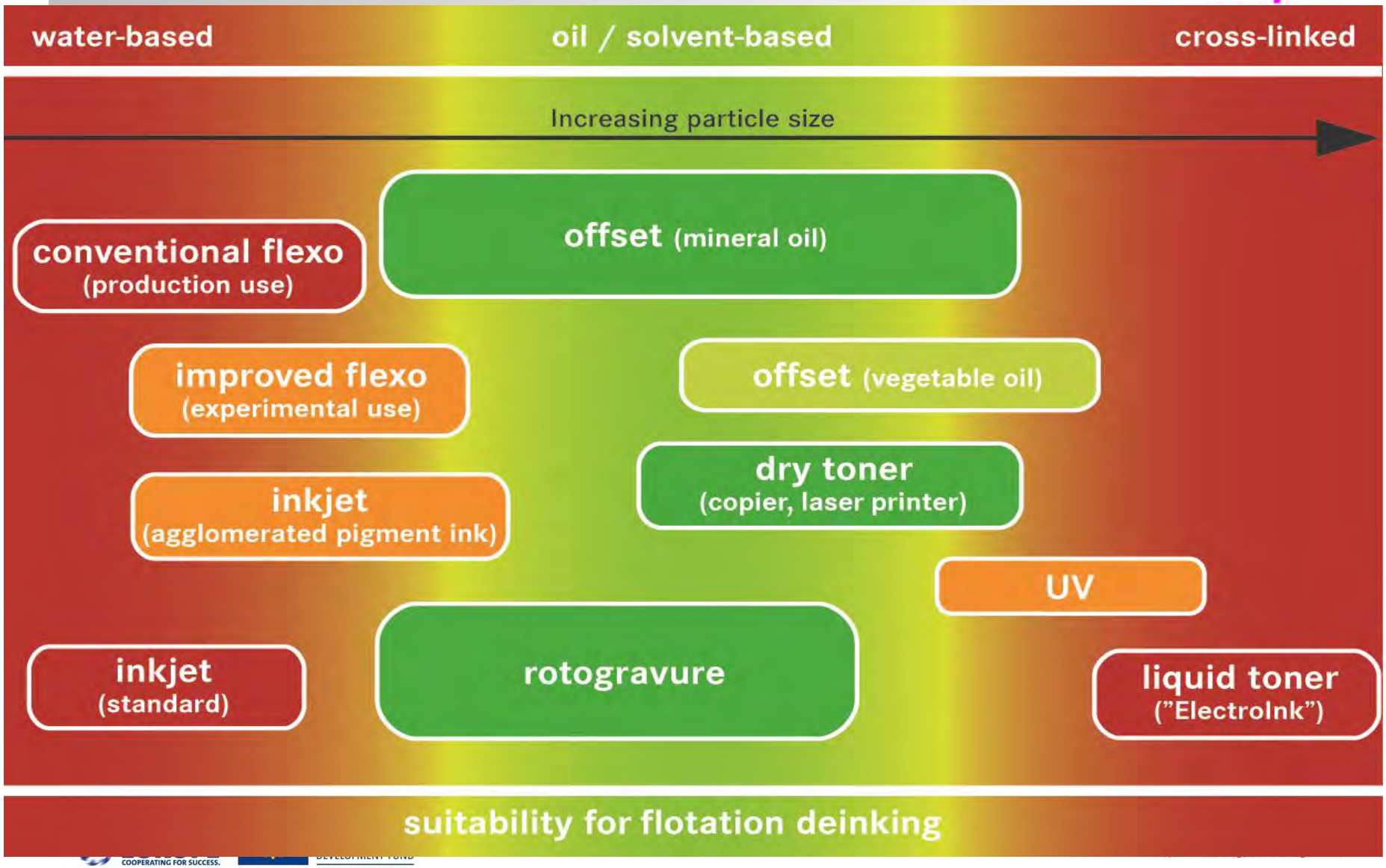
- 1st: Detachment of ink from the fibers (during re-pulping of the paper for recycling)

- 2nd: Removal of ink from the system
  - mostly used: flotation
  - in certain cases: washing

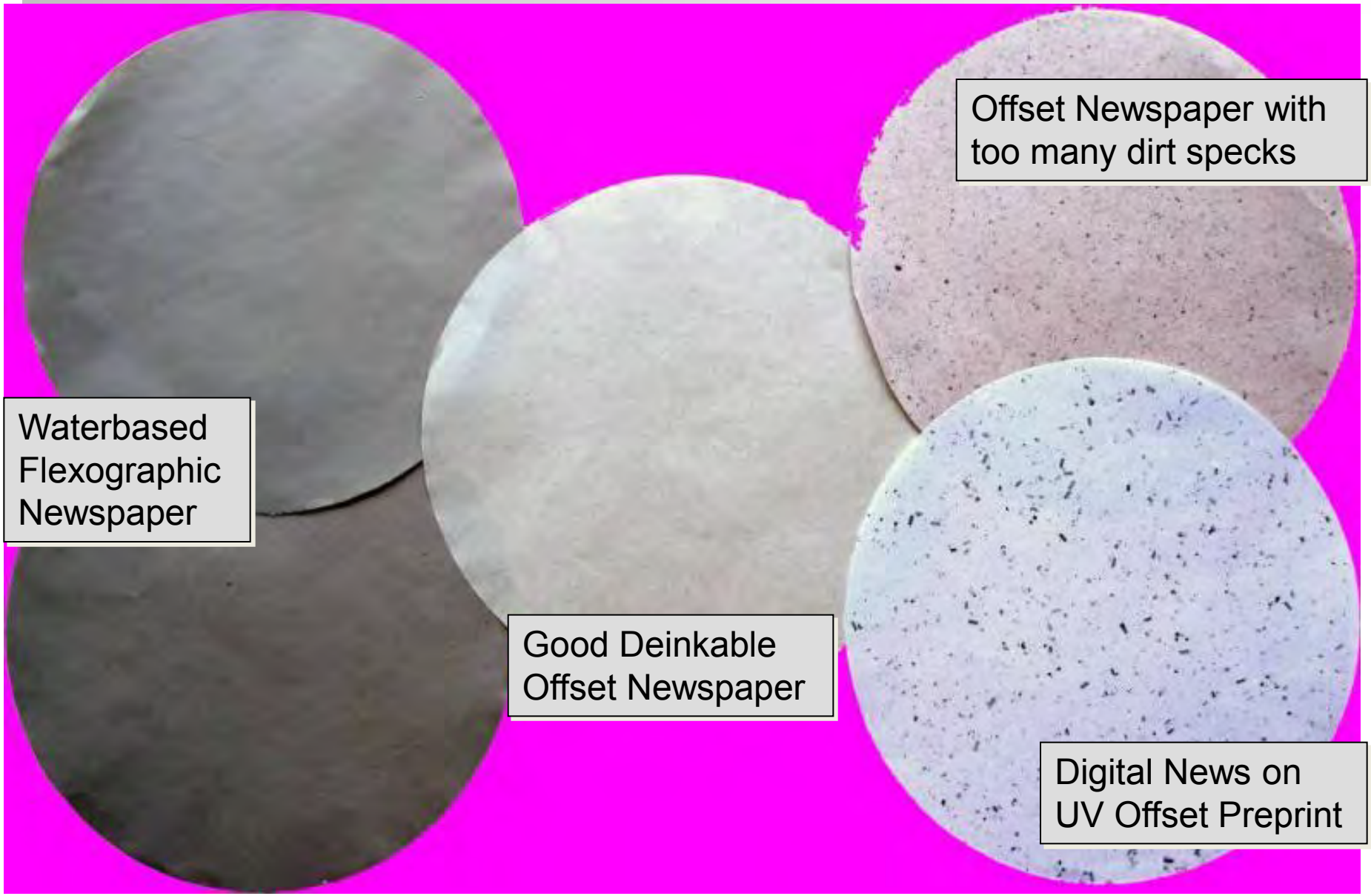
Efficient flotation deinking needs …

- a solid particle to be removed
  (will not work with dyes)
- a certain size range of the particles
  (ideally between 10 and 100 µm)
- hydrophobic particles
- the proper chemistry
  (deinking processes for newspapers and magazines use a detergent-like mix of chemical additives)

Printing – Deinking



Laboratory hand sheets from deinked pulp



Evaluation of deinkability

INGEDE Method 11: Simulation of pulping and flotation

Objectives	Evaluated Parameters	
High Reflection	Luminosity Y of Deinked Pulp	Quality Parameters
High Optical Cleanliness	Dirt Area A* of Deinked Pulp	
No Color Shade	a* Value of Deinked Pulp	
High Ink Removal	Ink Elimination IE	Process Parameters
No Discoloration of White Water	Filtrate Darkening ΔY	

Conversion of the results to a score system

Assessment of deinkability

- Procedure in the “Deinking Scorecard”
  - Simulation of essential process steps in laboratory scale (INGEDE Method 11)
  - Assessment of five parameters (cleanliness in two sub-categories)
  - Definition of a threshold (equal for all product categories) for each parameter
  - Definition of a target (depending on the category of the printed product – newspaper, magazine, stationery) for each parameter
  - Calculation of a score for each parameter
- The total score of all parameters allows an overall assessment of the product‘s deinkability
- If one or more of the thresholds is not achieved, then the assessment is “not suitable for deinking”

Deinkability Score

Assessment of test results

Score	Assessment of deinkability
71 to 100 Points	Good deinkability
51 to 70 Points	Fair deinkability
0 to 50 Points	Tolerable
negative (failed to meet at least one threshold)	Not suitable for deinking*

*The product may be well recyclable without deinking

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Revision of the Deinking Scorecard (1)

- Total yield replaced by **fibre yield** and **minimum** set to **65%**
- Luminosity replaced by **brightness** to distinguish between the two product categories "**Low ink coverage products**"
- **Luminosity target lowered** from 90 to **80** for category "Low ink coverage products > 75"
- **Luminosity threshold increased** from 47 to **67** points for this category

Revision of the Deinking Scorecard (2)

- **Distinction** between “Magazines” and “Low ink coverage products” **improved** – by a more detailed description and by measuring mean grey value in case of doubts
- Definition how to assess print products with a very **low ink coverage** (if all results but IE are positive)
- **Reporting**
- **Exemptions from testing** for products which are usually good deinkable

Deinkability tests

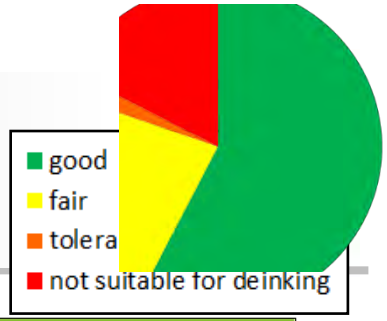
EcoPaperLoop

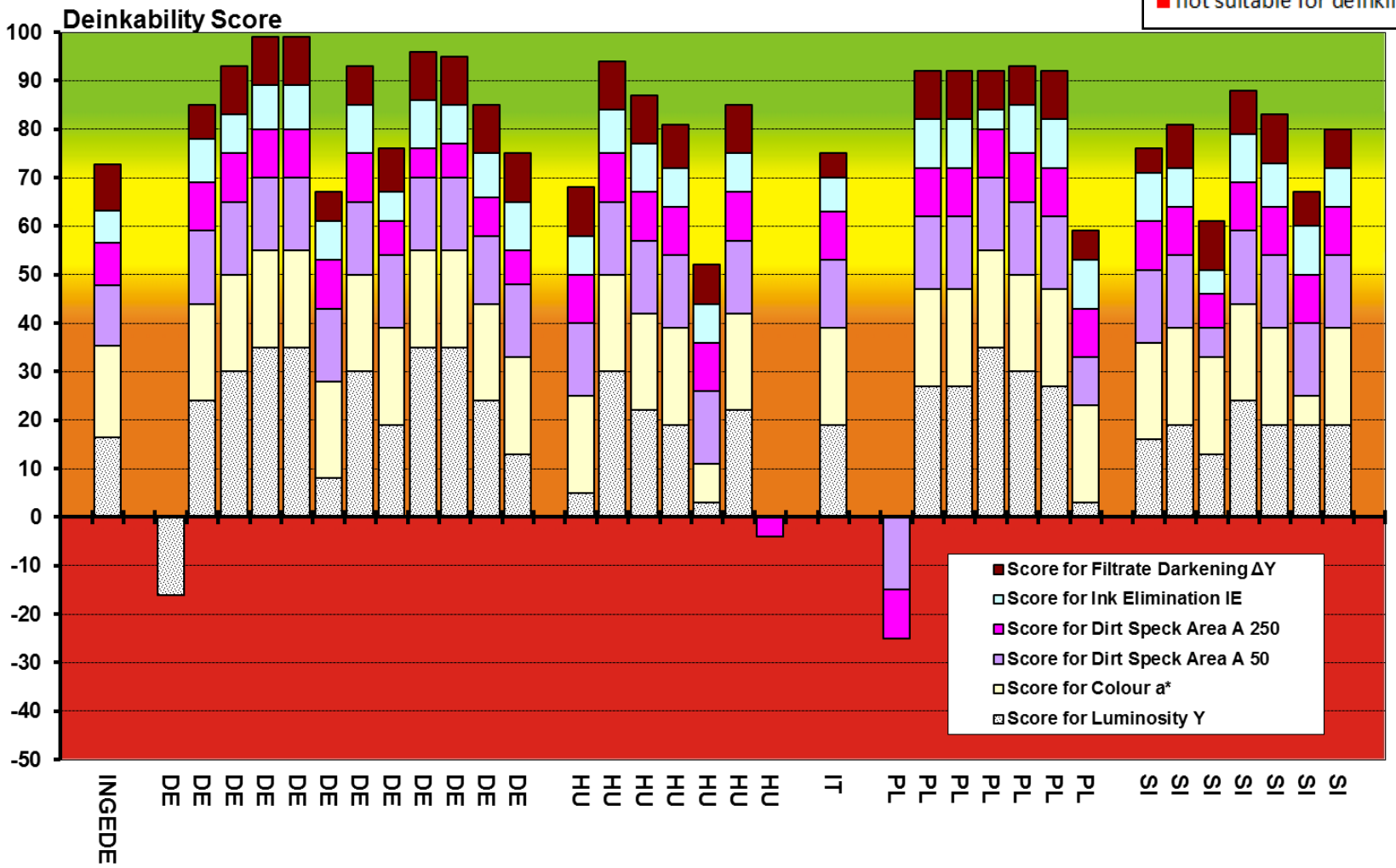
- about 80 newspapers and magazines
- 2013 to 2014
- originating from Germany, Hungary, Italy, Poland and Slovenia

INGEDE

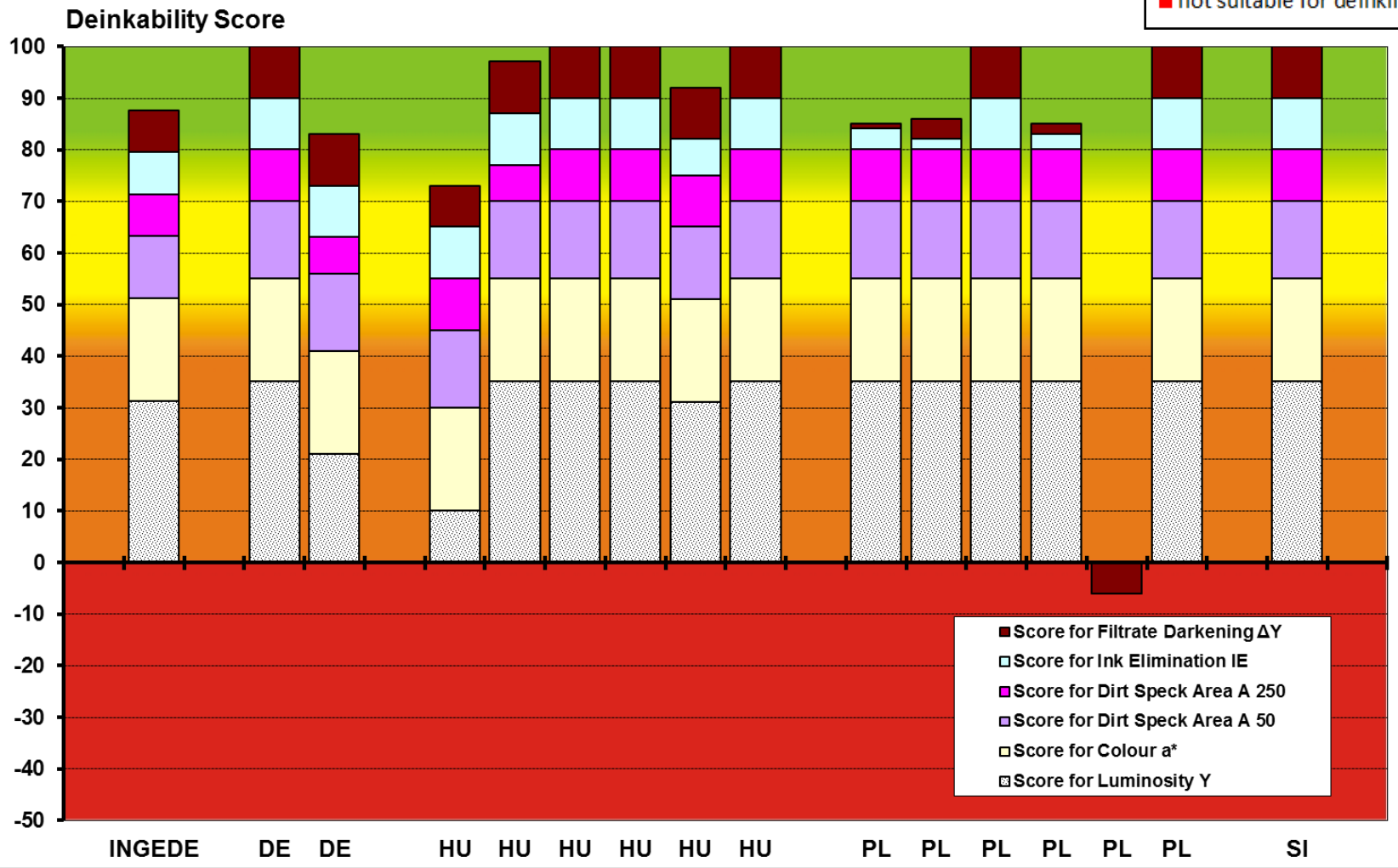
- about 470 printed products of all categories
- 2005 to 2014
- from Northern, Southern and Western Europe, as well as occasionally from USA and Japan

Deinkability of Newsprint (Offset)

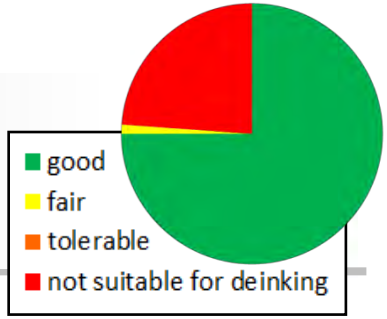


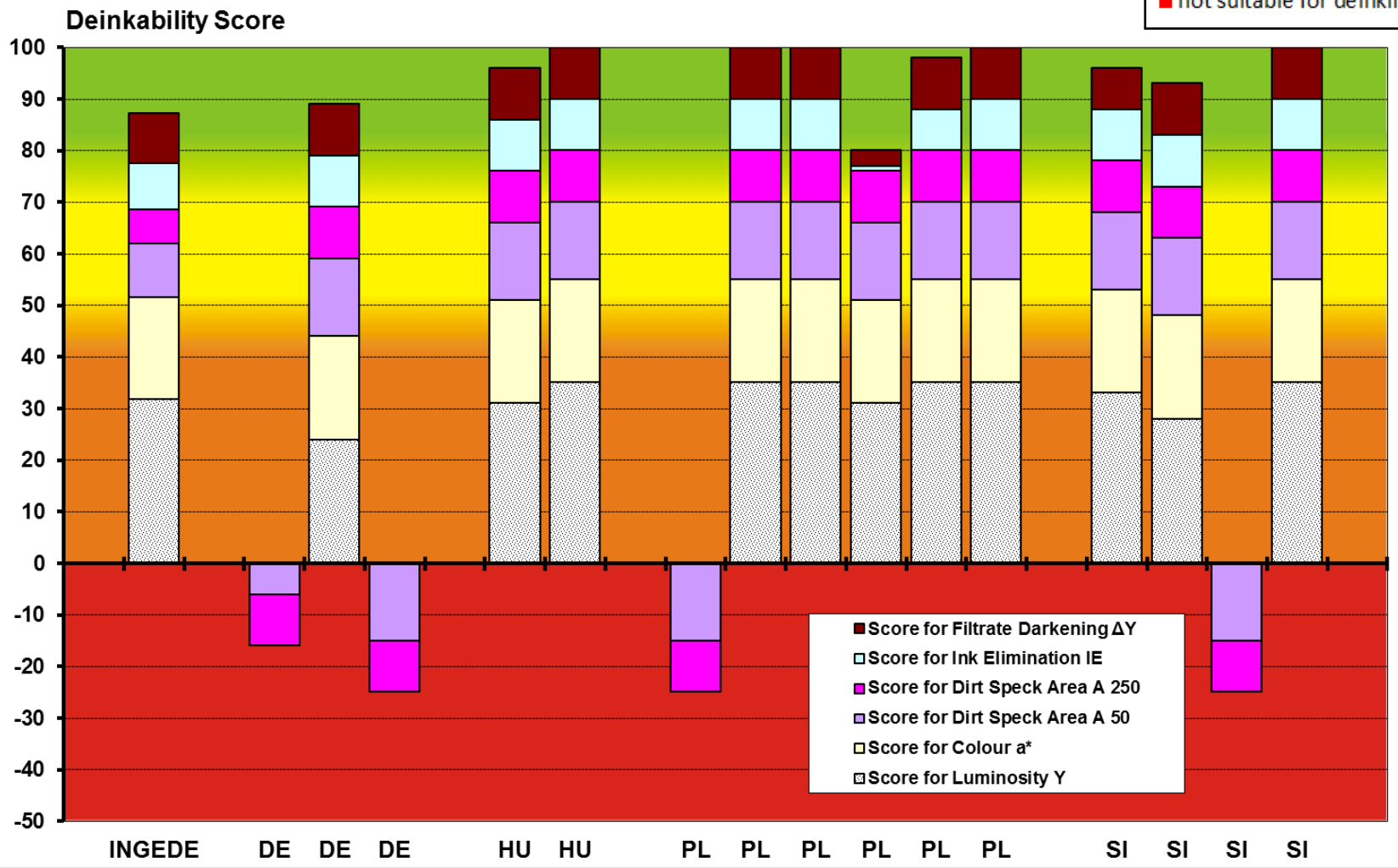


Deinkability of uncoated magazine (Offset)

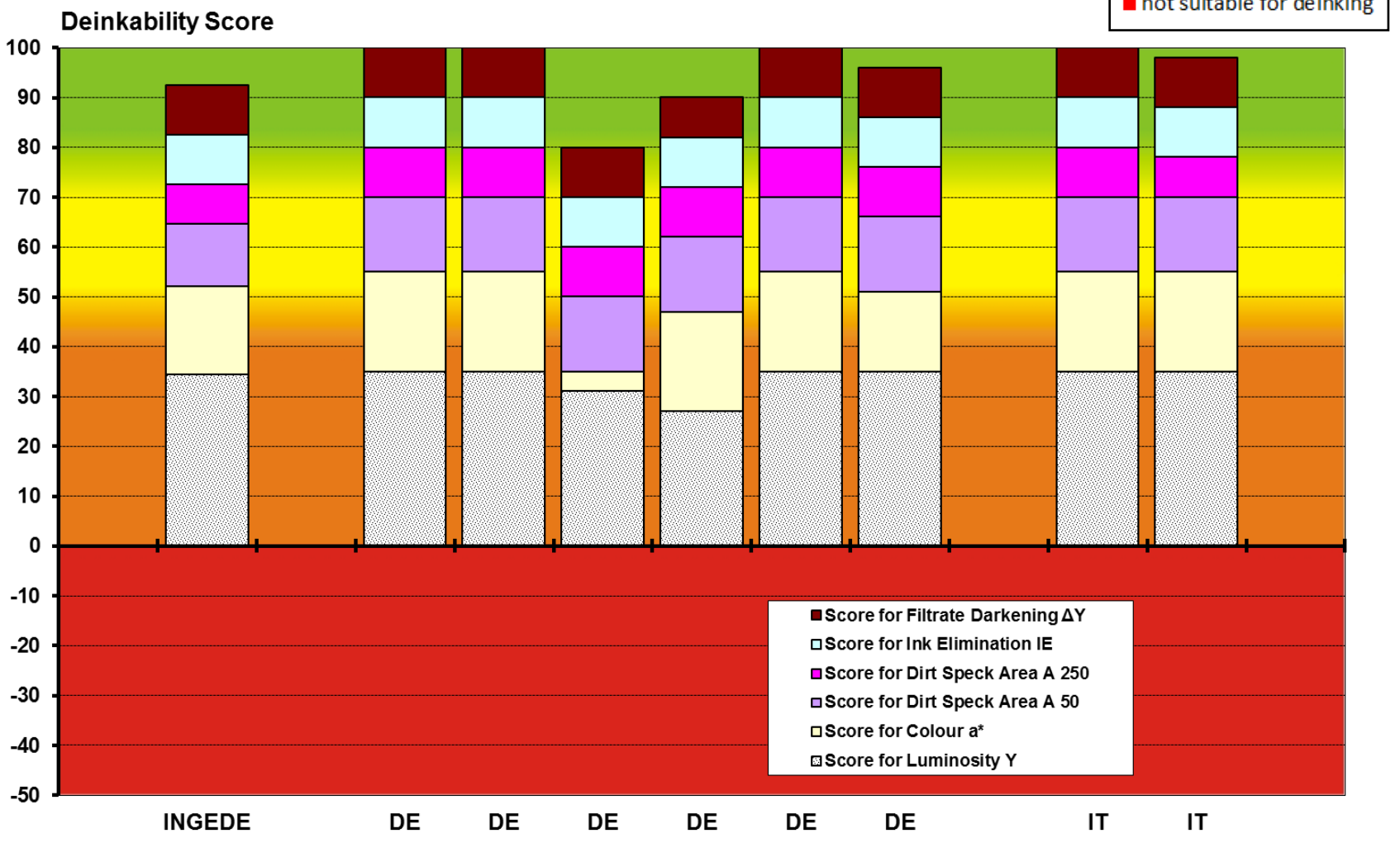


Deinkability of coated magazine (Offset)

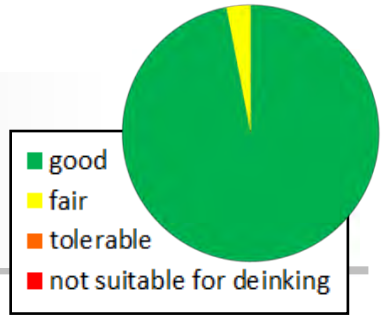


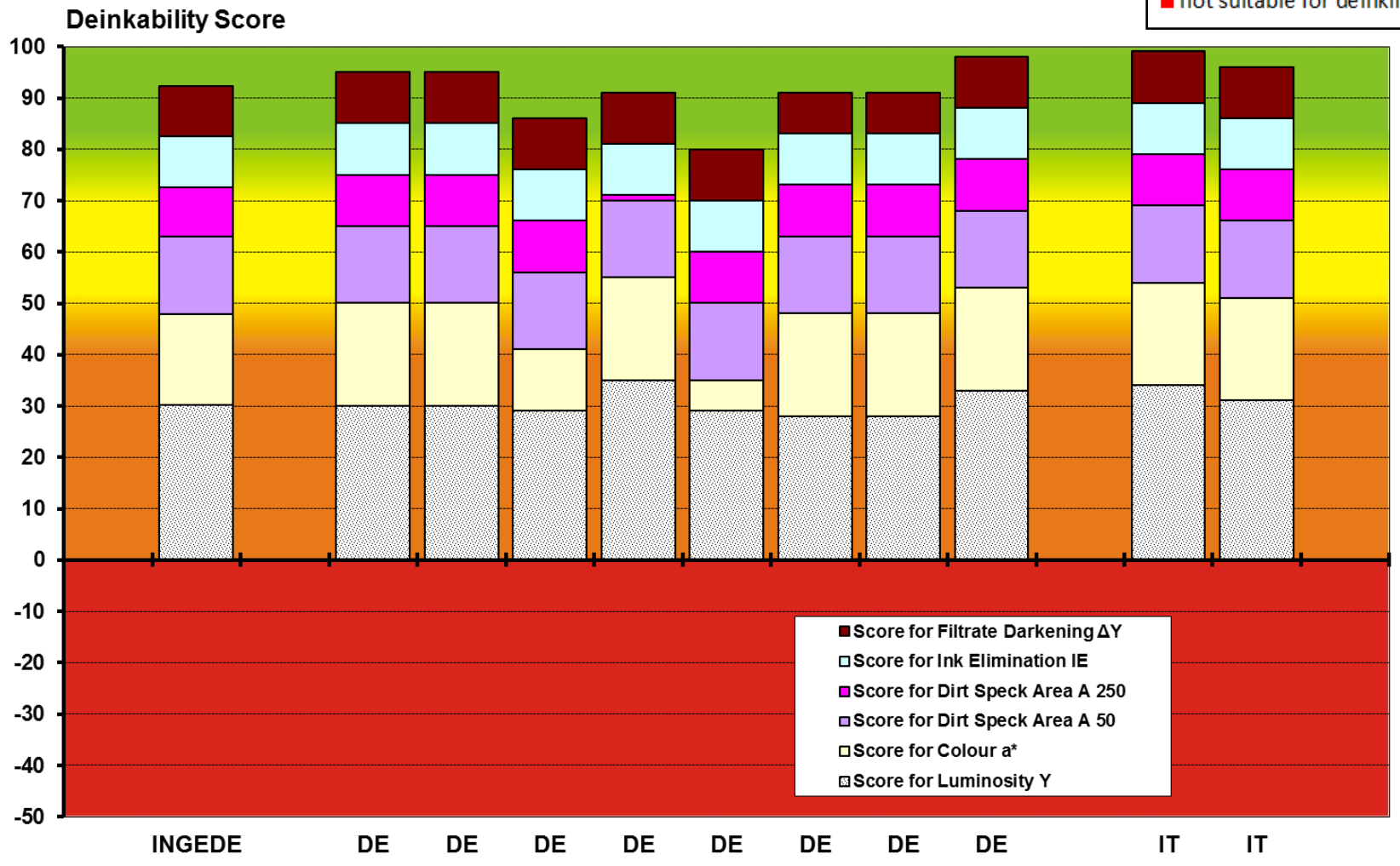


Deinkability of uncoated magazine (Rotogravure)

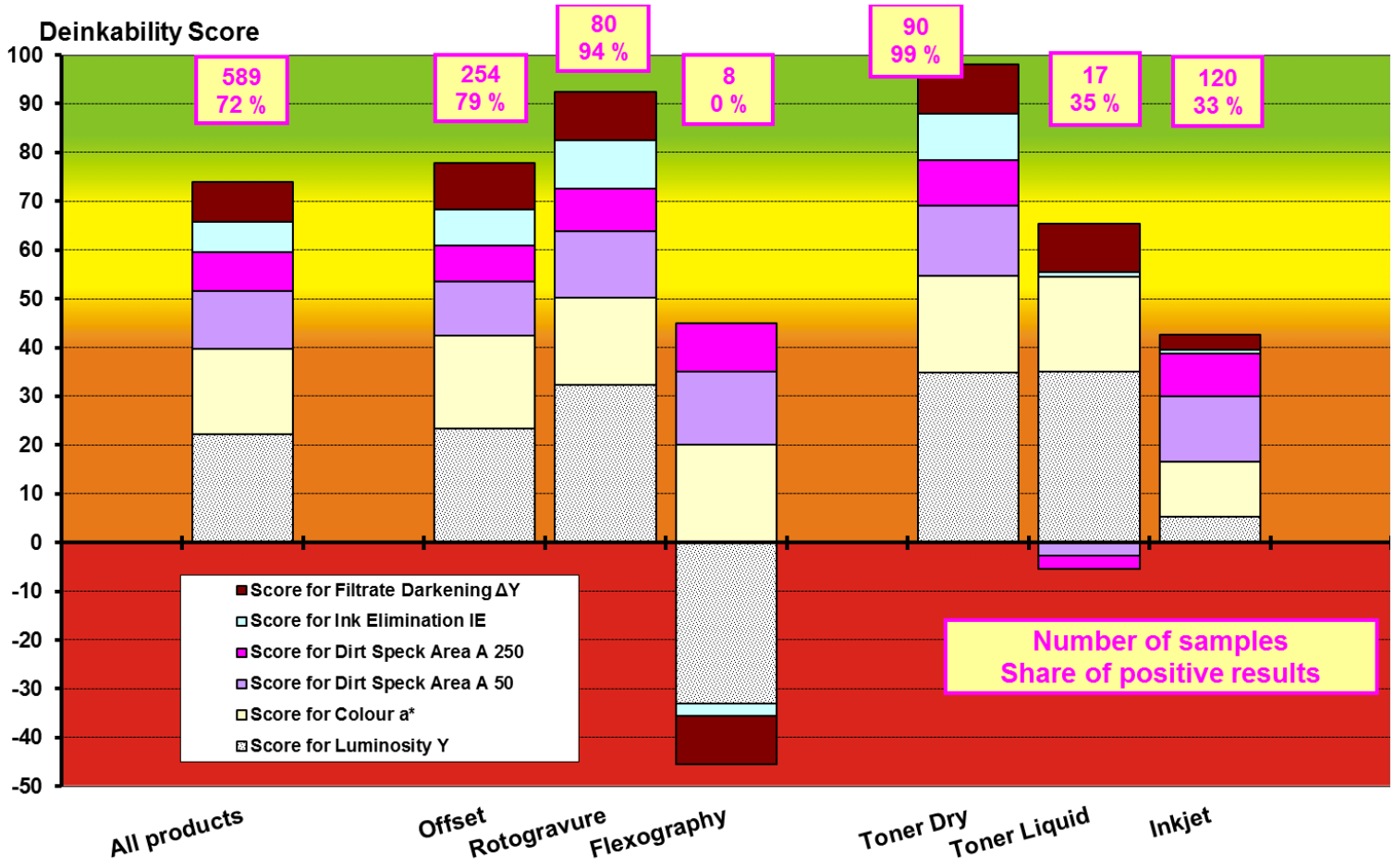


Deinkability of coated magazine (Rotogravure)

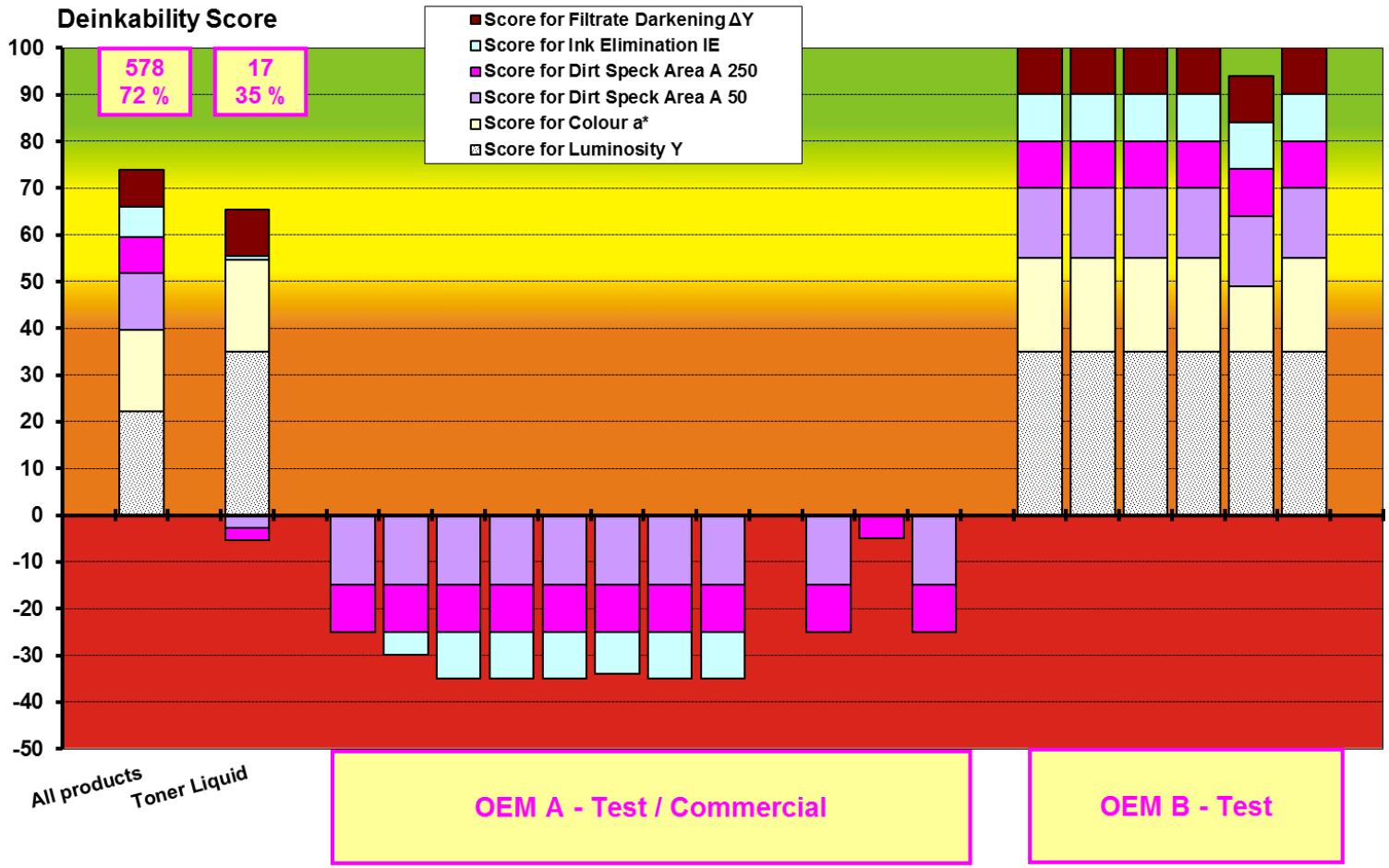




Deinkability results by printing technology



Deinkability results of liquid toner prints from different vendors



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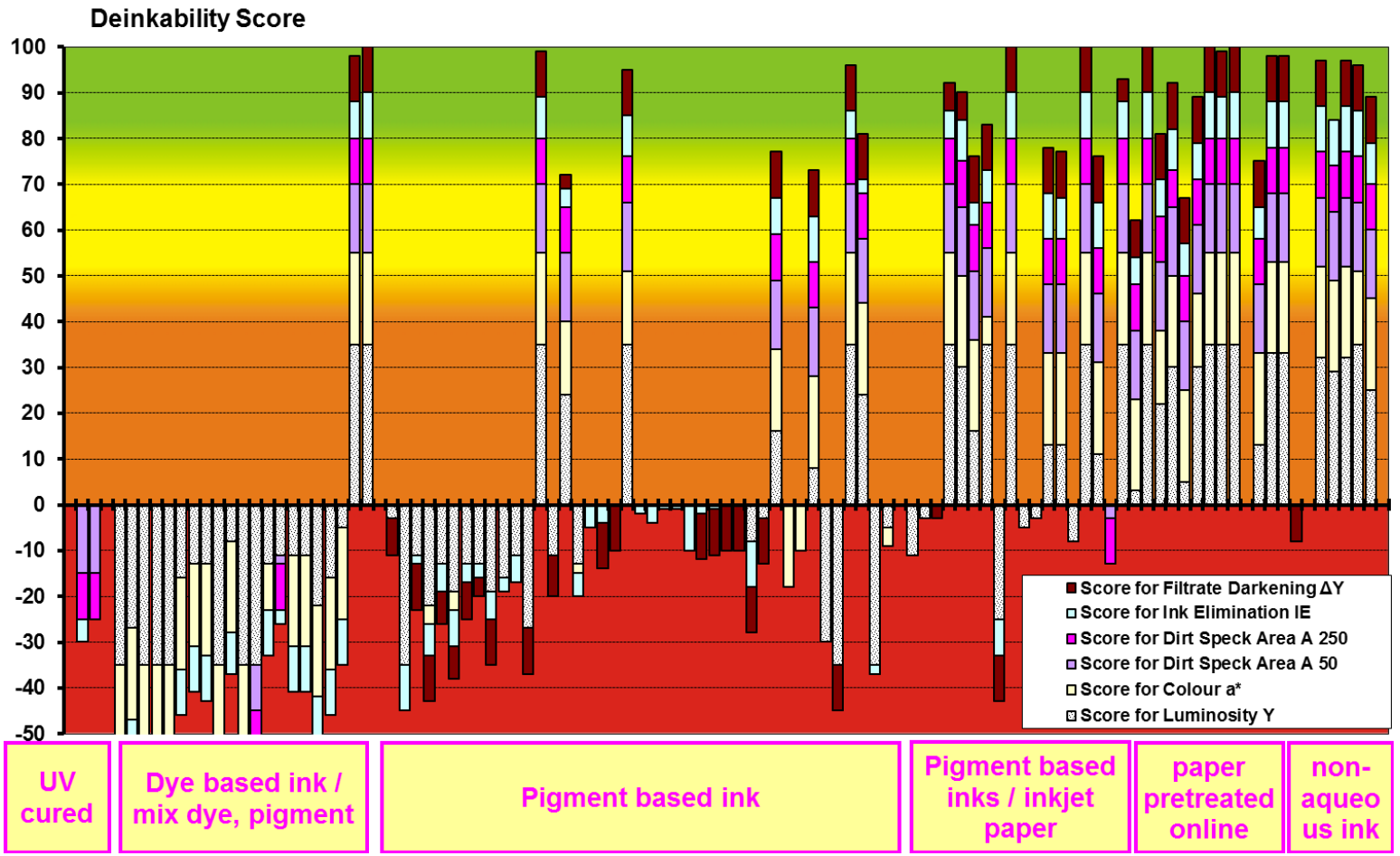
Individual deinkability results of inkjet prints grouped by ink technology and substrate



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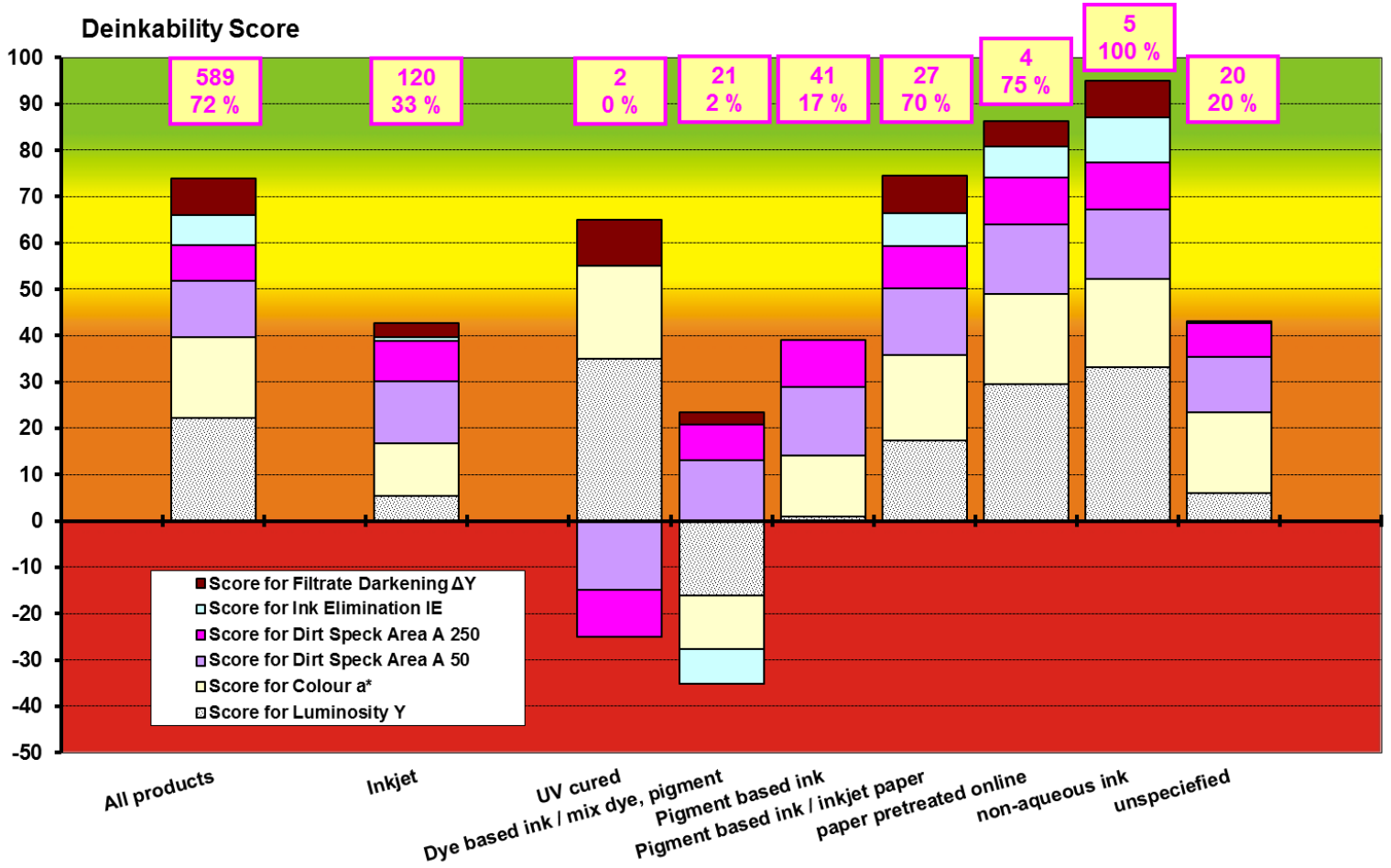
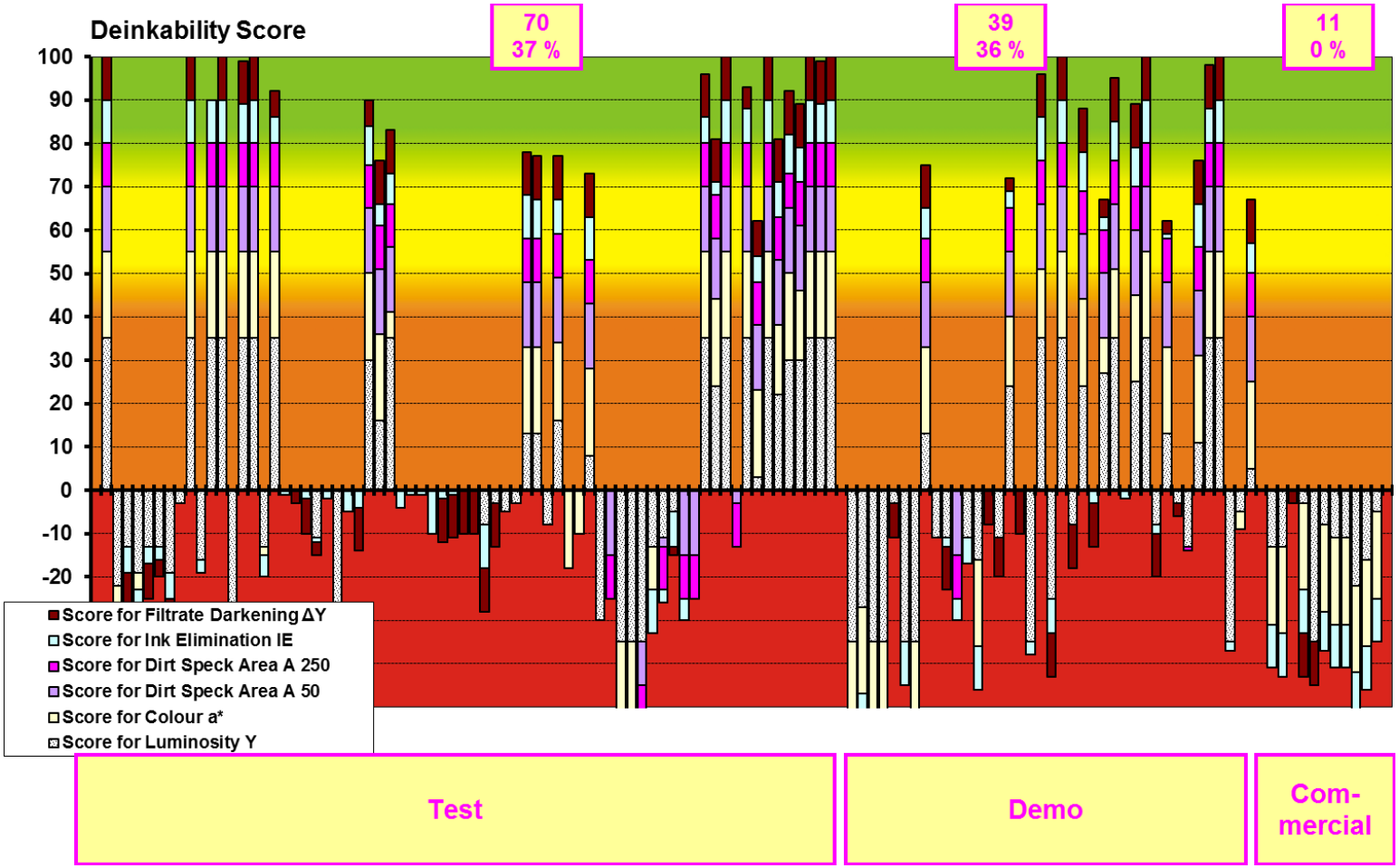
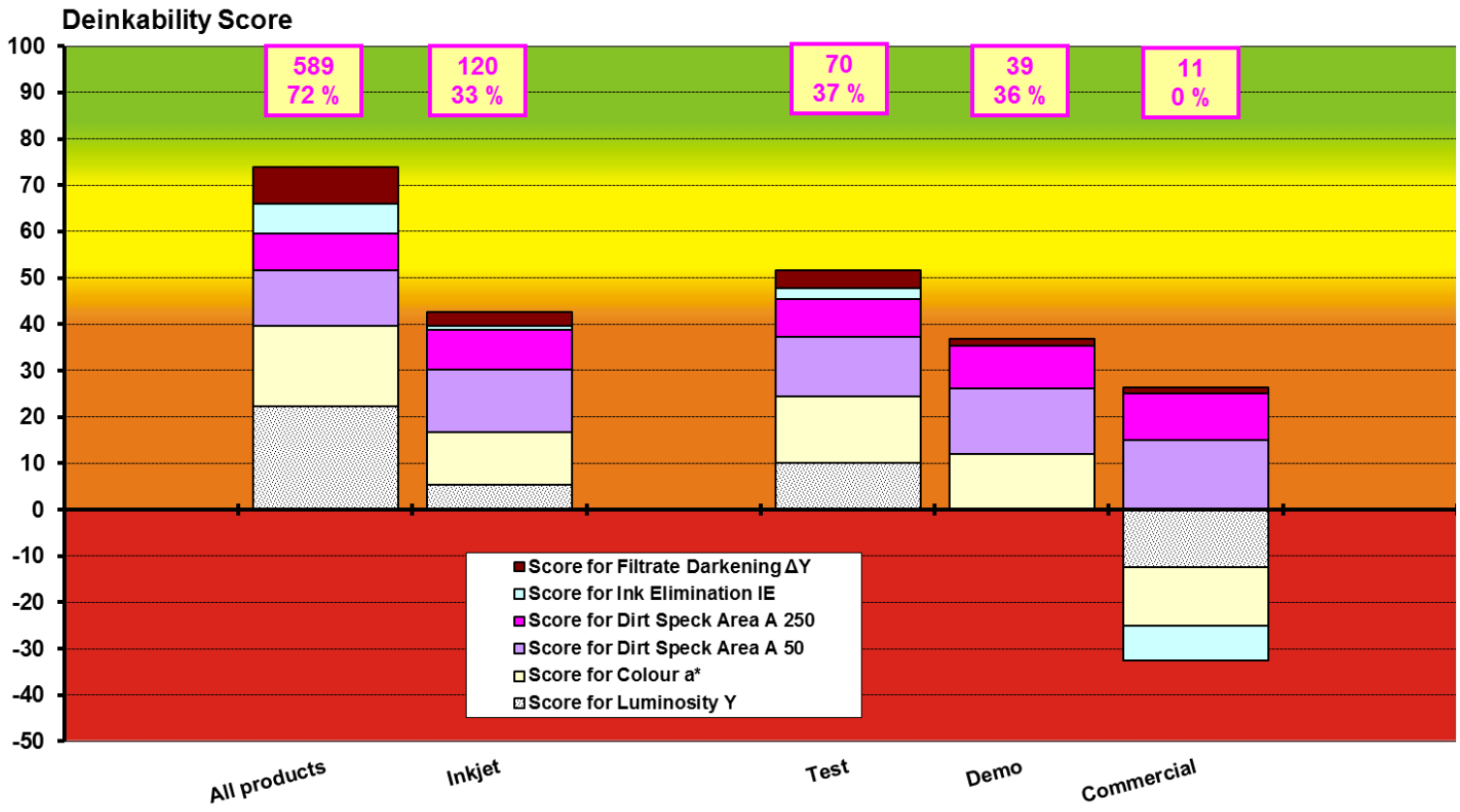
Average deinkability results of inkjet prints
grouped by ink technology and substrate



Deinkability results of test, demo and commercial inkjet prints

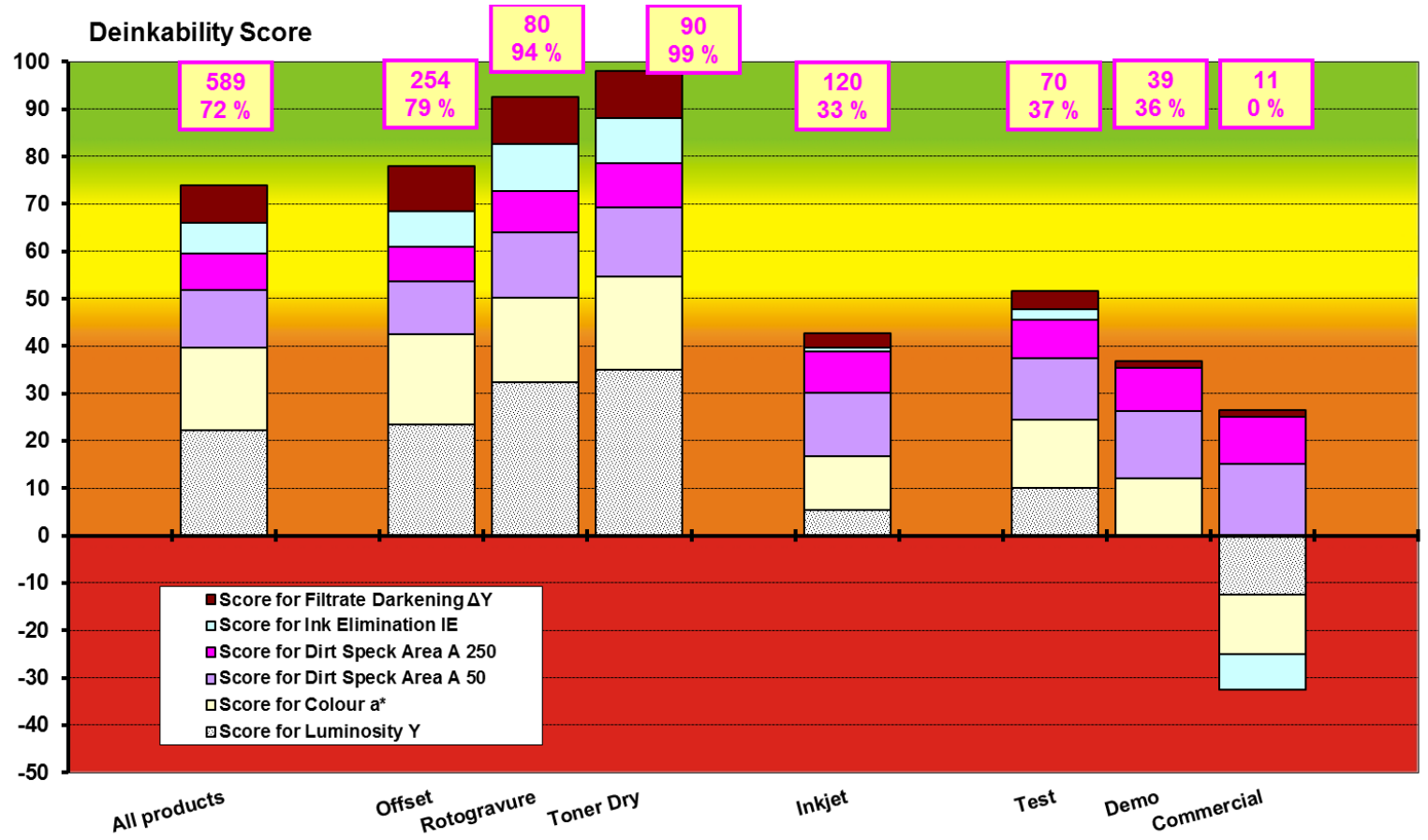


Deinkability results of test, demo and commercial inkjet prints



Average deinkability results of test, demo and commercial inkjet

in comparison with offset, gravure and dry toner prints



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Conclusion

- **Deinkability results** of newspapers and magazines from EcoPaperLoop partner countries **do not show a significant difference** to existing data
- Deinkers are concerned about **liquid toner** and **inkjet prints**
- **Liquid toner**:
  - Deinkability issue: Many and large dirt specks
  - There is no sign from the field of a better deinking performance of the prints from the market leader
  - Competitive systems with better deinkability are not installed yet
- **Inkjet**:
  - Deinkability issue: Low brightness, filtrate darkening, partly discolouration
  - All prints from the field failed in deinkability
  - Even R&D based test prints in average perform worse than offset, rotogravure and dry toner prints

Thank you very much for your attention!

This project is implemented through the CENTRAL EUROPE Programme co-financed by the ERDF (European Regional Development Fund)

www.ecopaperloop.eu

Sources

Pictures

- http://www.persoenlich.ch
- INGEDE
- http://www.graphische-revue.at

Deinkability results

- EcoPaperLoop
- INGEDE