INGEDE

Recyclability | Paper for Recycling | Deinking Process

INGEDE Position Paper UV Inks and Varnish

Background

UV-curable applications during printing

Within the last years, more and more printed products have been produced with UV inks and UV varnishes. Further development has also been within the curing of such UV products, e. g. by the development of low-energy UV (LE-UV) and of light emitting diodes (LED-UV). Here ink and varnishes are applied to paper and then dried by curing the material with UV light. To start the internal drying of the ink or varnish, photo initiators are activated by the UV light and start a polymerisation process as a kind of a chain reaction. These polymers lead to a strong film, attached to the paper surface.

UV printed or varnished products during processing of paper for recycling

Key processes of paper for recycling during the production of graphic paper is the detachment of the ink from the paper and the fragmentation of the ink during the pulping process, by use of mechanical forces, supported by deinking chemistry (e. g. caustic soda). In a further step these fragmented particles are separated from the fibres using deinking flotation, a process in which air is blown to the diluted pulped material and – by support of soap – ink particles are brought to the surface of the liquid with air bubbles. Crucial for this process is that the ink particles fragment into a suitable particle size distribution (5–180 µm) and show a hydrophobic surface behaviour.

In the case of UV inks, the strongly bonded ink particles are resistant to a proper particle fragmentation, and often form ink particles beyond the range of deinking flotation that also lack the necessary hydrophobicity. These particles remain in the final paper as visible dots called dirt specks.

UV varnish particles are strongly bonded and are resistant to the fragmentation. Even if a print product is printed with suitable processes for deinking flotation (e. g. standard offset), the varnish layer on top of the printing ink could hinder a proper fragmentation of the ink particles.

Today, most deinking plants are equipped with a second mechanical treatment (dispersing) and second flotation step for the removal of ink particles. But even there, the additional energy input often is not sufficient to break down the strong ink or varnish layers.

Measuring the deinkability: INGEDE Method 11

The measurement of the deinkability behaviour of printed products is done by a simplified laboratory deinking process, as it is defined by INGEDE Method 11. In laboratory scale, the final printed product (fully cured) is disintegrated and floated. The final pulp quality is measured for its optical properties, e. g. luminosity and dirt specks.

Non-critical products

All statements are only valid for completely cured products. There is no *general* statement about non-critical products possible now, already some good deinkable inks are on the market. INGEDE supports scientific approaches for expanding the knowledge about factors influencing the deinkability UV-cured prints. The interaction between paper (grammage, coated or non-coated) as well as the ink to paper

ratio (e. g. simplex, duplex) has a high influence on the results. In different tests a good deinkability could be observed for high paper grammages as well as for coated papers and low ink coverages.

Recent test results show good deinkability for some newly developed inks, still the wide market shows a major deinkability issue.

Critical products

During investigations problematic print products regarding their deinkability show up with low paper grammage, uncoated papers and/or high ink coverage.

A critical aspect is the recycling of UV printer waste with bad deinkability. There, the UV cured prints enter a deinking plant in a high concentration – much higher than in the mix of paper in the household collection or in material collected from retailers. Therefore, the deinking processes are overloaded, resulting in unusable deinked pulp with a too high amount of dirt specks.

Conclusion

For certainty, INGEDE recommends using the Scorecard “Assessment of Printed Product Recyclability – Deinkability Score”, published by the European Paper Recycling Council (EPRC).

INGEDE supports the IGF Project “Grafischer UV-Druck” (IGF-Projekt 20476 BG, performed by PMV TU Darmstadt and SID Sächsisches Institut für die Druckindustrie Leipzig) and will discuss further actions when the results are available.

For further information, please refer to the brochure “Niedrigenergie- und LED-UV-Druck” (in German language) by Bundesverband Druck und Medien e.V. (bvdm).

Sources

EPRC Deinkability Scores

INGEDE Method 11

IGF-Projekt UV-Farben im Bogenoffsetdruck - Deinkbarkeit und migrierfähige Inhaltsstoffe

bvdm-Broschüre Niedrigenergie- und LED-UV-Druck