Quo vadis, Mixed Paper?
Aspects of quality and availability of paper for recycling

Andreas Faul, Manfred Geistbeck, Uwe Wollsächler

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Quo vadis, mixed paper?

- Setting the scene
- Statistics and quality aspects
- Trends to be considered
- Material flows
- Availability of white paper for recycling
Mixed paper – definitions

- A mixture of various grades of paper and board (EN 643, grade 1.01.00, ordinary mixed paper and board)
- A mixture of various qualities of paper and board, containing a maximum of 40% newspapers and magazines (EN 643, grade 1.02.00, mixed paper and board)
- A mixture of various paper grades that can be found in the groups 1 to 5 (EN 643, grade 5.01.00, mixed papers)

Composition of paper for recycling from households

The content of graphic papers (mainly newspapers, magazines and flyers) is typically between 50 and 65%

Packaging papers and board are 35 to 50%

In addition, there are some non-paper materials
Output of sorting plants

- **Graphic paper**
  (Usually grade 1.11.00, sorted graphic paper for deinking)
- **Packaging paper**
- **Mixed paper**
- **F-Mix**
  (low amount)

Fibrous raw materials of the European paper industry

In CEPI statistics, the group 'Mixed Grades' consists of the grades 1.01.00, 1.02.00, 1.03.00, 5.01.00, 5.02.00, 5.03.00, 5.03.01, 5.05.00, 5.05.01, 5.05.02 and 5.11.00
Utilisation of paper for recycling in the European paper industry

In this CEPI chart, the group 'Mixed Grades' consists of the grades 1.01.00, 1.02.00, 1.03.00, 5.01.00, 5.02.00, 5.03.00, 5.03.01, 5.05.00, 5.05.01, 5.05.02 and 5.11.00 (CEPI countries)

Key quality parameters of main paper & board grades

- Graphic papers: Optical properties
- Case materials: SCT, CMT, bursting strength
- Carton Board: Bulk, bending stiffness, hygiene
- Wrappings, other paper & board for packaging: (no statement due to wide variety of paper grades)
CEPI utilisation of mixed grades by sector

Main reasons for utilisation of mixed grades

- Case materials: Costs
- Carton board: Bulk and thus bending stiffness by graphic portion
- Wrappings, other paper & board for packaging: (no statement due to wide variety of paper grades)
Trends to be considered

- Shift to less graphic and more packaging papers from households
- Increasing amount of white top liners based on paper for recycling
- Increasing ash levels
- Decreasing strength properties and bulk in mixed and packaging grades
- AOCC is not as strong anymore as it used to be

Ash content of paper for recycling

Mill experience on 1.02 and 1.04: Ash content +8 to 10% from 2000 to 2016. → Trend continues

New data from PMV to be expected during 2018.

Source: IGF Project 15408, PMV Darmstadt, November 2010
Important results of IGF 15408 / Mill experience

• Most strength parameters in grades 1.02 and 1.04 dropped by 5–10 % from 1999 to 2010
  → Compensation in production by raw material mix, starch, dry strength agents and/or grammage

• COD increased by 10–20 %
  → Adding starch is obviously the dominant compensation

• Bending stiffness decreased by 10–15 % in 16 years
  → Compensation in board production by addition of virgin fibres (mechanical pulp or CTMP), lower coating weights (more expensive pigments), lower press loading, higher grammage

Situation of graphic paper for recycling

• Supply is generally short

• Standard grades (newspapers & magazines) partly
  – have to be shipped over long distances
  – are of poor quality (purity) due to unsuitable collection and handling

Some mills decreased utilisation of paper for recycling and increased virgin fibres

• White grades used for white top liners do not return to the graphic loop
Material flows of news & mags

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Tonnage (1 000 t)</th>
<th>Description, (Source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption of graphic paper</td>
<td>26 849</td>
<td>(CEPI Key Statistics 2016)</td>
</tr>
<tr>
<td>+ 2 % Additives</td>
<td>27 386</td>
<td>Printing ink etc. (estimation)</td>
</tr>
<tr>
<td>+ 2 % Import of graphic products</td>
<td>27 934</td>
<td>User manuals etc. (estimation)</td>
</tr>
<tr>
<td>Availability at 78.4 % graphic recycling rate (AGRAPA 2016: 83.3 %)</td>
<td>23 269</td>
<td>Calculated rate in in order to match figures at the bottom of the table</td>
</tr>
<tr>
<td>Net export of paper for recycling (graphic products only)</td>
<td>-1 723</td>
<td>Estimated 20 % share von 8 614 000 to</td>
</tr>
<tr>
<td>Graphic products to Medium and High Grades of paper for recycling</td>
<td>-4 554</td>
<td>Estimated 90 % of utilisation of Other Grades (CEPI 2016)</td>
</tr>
<tr>
<td>Graphic products ‘leakage’ to Corrugated and Kraft</td>
<td>-1 187</td>
<td>Estimated 5 % of utilisation of Corrugated and Kraft (CEPI 2016, IGF 15408)</td>
</tr>
<tr>
<td>Newspapers &amp; Magazines ‘leakage’ to Mixed Grades</td>
<td>-4 508</td>
<td>Estimated 50 % of utilisation of Mixed Grades (CEPI 2016)</td>
</tr>
<tr>
<td>Availability of Newspapers &amp; Magazines</td>
<td>9 936</td>
<td></td>
</tr>
<tr>
<td>Actual utilisation of News &amp; Mags</td>
<td>9 936</td>
<td>(CEPI Key Statistics 2016)</td>
</tr>
</tbody>
</table>

Increasing availability of white paper for recycling – starting points

- **Increasing collection rates** from households
- **Improving separation efficiency** of sorting plants
- **Selective collection** of graphic paper for recycling
- Stepping up of high-quality collection from offices
Increasing collection rates from households – key factors

- Education/environmental consciousness
- Provision of convenient collection systems
- Fees/incentives

- Negative example: Apartment buildings with waste chutes and low waste fee
  → High paper content in residual waste

Improving separation efficiency of sorting plants

- INGEDE started with a systematic data collection from sorting plants
  - 1st step: from plants of members and their subsidiaries
  - 2nd step: from external plants
Selective collection of graphic paper for recycling – examples

- Separation at the consumer is the cheapest way of sorting!
- Collection by:
  - Collection shops
  - Bring banks
  - Volunteer collection
  - Resource yards
  - Multi chamber collection trucks

Selective collection of graphic paper for recycling – considerations

- Monitored acceptance (collection shops, volunteer collection, manned resource yards and possibly multi chamber collection trucks) do not require additional sorting
- Multi container bring banks and resource yards can be used for selective collection
- Multi chamber collection trucks are probably only feasible in rural areas
Stepping up of high-quality collection from offices

- Conveniently located collection bins
- Provisions for confidential material (Pulping guarantees confidentiality!)

Conclusions

- Mixed grades change their properties due to
  - Changing product use by consumers
  - Higher ash contents in all relevant paper products
  - Increase of white top liners
- Sorting becomes less attractive due to
  - Lower content of the products with the highest added value
- Possible reactions
  - Improvement of sorting efficiency
  - Partly substitution of separate paper & board collection by selective collection
Thank you for your attention!