Challenges for implementation of nanotechnology in industrial applications

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Research & Development
Mondi Uncoated Fine Paper
Mondi Group

Mondi is an international packaging and paper Group, with production operations across 28 countries and about 23,400 employees.

Its key operations and interests are in central Europe, Russia and South Africa.

The Group is involved in the manufacture of packaging paper, converted packaging products and uncoated fine paper.
Business Structure Mondi Group

Europe & International (E&I)

- Uncoated Fine Paper
  - Uncoated Fine Paper

South Africa

- Corrugated
  - Containerboard
  - Corrugated Packaging

- Bags & Coatings
  - Kraft Paper
  - Industrial Bags
  - Coatings & Consumer Packaging

- Merebank
- Richards Bay
- Forests

Aylesford
Newsprint

Mondi Shanduka
Newsprint

50%
50%
Mondi Europe & International

Key Figures

The Europe & International Division (E&I), headquartered in Vienna, has around 86 production sites in 28 countries and about 21,000 employees.

Our division consists of the Uncoated Fine Paper, Corrugated and Bags & Coatings businesses.

We are specialists in:
● Office, digital and offset paper
● Containerboard
● Corrugated packaging
● Kraft paper
● Industrial bags
● Consumer packaging
● Extrusion coatings
● Release liner

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<tr>
<th></th>
<th>Half-year 1/2012</th>
<th>Half-year 1/2011</th>
<th>2011</th>
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<tbody>
<tr>
<td><strong>Revenue</strong></td>
<td>€2,528m</td>
<td>€2,684m</td>
<td>€5,162m</td>
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<tr>
<td>Uncoated Fine Paper</td>
<td>€749m</td>
<td>€734m</td>
<td>€1,429m</td>
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<tr>
<td>Corrugated</td>
<td>€680m</td>
<td>€704m</td>
<td>€1,384m</td>
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<tr>
<td>Bags &amp; Coatings</td>
<td>€1,149m</td>
<td>€1,319m</td>
<td>€2,478m</td>
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<tr>
<td><strong>Underlying operating profit</strong></td>
<td>€261m</td>
<td>€351m</td>
<td>€611m</td>
</tr>
<tr>
<td>Uncoated Fine Paper</td>
<td>€100m</td>
<td>€118m</td>
<td>€205m</td>
</tr>
<tr>
<td>Corrugated</td>
<td>€65m</td>
<td>€105m</td>
<td>€178m</td>
</tr>
<tr>
<td>Bags &amp; Coatings</td>
<td>€96m</td>
<td>€128m</td>
<td>€228m</td>
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1 Including intra-segment revenue.

2 Operating profit of subsidiaries and joint ventures before special items.
Nanotechnology in/for paper & packaging?

- **Retention aids**
  - Microparticle → nanoparticle systems

- **Print colours**
  - Pigment based inks

- **Hydrophobization of paper and board**

- **Pigments for better printability**
  - e.g. laser, inkjet, offset printing

- **Improved barrier properties**
  - e.g. nano-clay

- **Intelligent packaging**
  - e.g. smart pigments
Case study I – pigmented paper
Case study II – smart pigments
Case study II – smart pigments
How to rule possible health risks?

- All (nano)particles, used in the formulation(s), are produced in closed system.

- Shape of the particles is not similar to „Nanotubes“.

- Particles agglomerate immediately after their production and are closely bound to the surface.

- Design and implementation of new measurement systems by industry to rigorously test any (nano)products before entering the market.

- Collaboration with academic institutions & organizations as well as EU-wide standards are necessary.
Possible solution for flexible materials – ADT (AcousticDustTester)

- High precision method allowing for the simultaneous determination of micro- and nanoparticle size distribution as well as the particle concentration.

- Developed in cooperation with Prof. Dr. Georg Reischl (Aerosol Physics Group, Physics Department, Univ. Vienna).

- Measurement of emissions from flexible surfaces is carried out under reproducible mechanical (i.e. acoustic) stress.
ADT Gerät
ADT measurement design
Particle size distribution
Outlook & partners

- Benchmarking of a wide range of paper & packaging materials

- Introduction of a (Austrian) standard

- Collaboration with other industrial segments (e.g. textile and plastics industry)

http://www.euro-nanotox.at/
FORWARD - LOOKING STATEMENTS

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