LANXESS Capital Markets Day 2012
High Performance Materials –
A global player for lightweight solutions

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Agenda

- HPM overview – Strong global business setup
  - Growth driven by innovative lightweight solutions
  - Innovation secures future growth
  - Summary

“Green Mobility” energized by LANXESS

Chemistry is the key to “Green Mobility”

Performance Polymers: ~60% of group sales; ~60% of segment earnings
- Butyl Rubber
- Performance Butadiene Rubbers
- Technical Rubber Products
- High Performance Materials
High Performance Materials – Business overview

<table>
<thead>
<tr>
<th>HPM overview</th>
<th>Sales by end use</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key figures</strong></td>
<td><strong>[BU sales]</strong></td>
<td><strong>Size:</strong> &gt;€7.5 bn</td>
</tr>
<tr>
<td>• Sales: &gt;€500 m</td>
<td>Automotive 35%</td>
<td><strong>Position:</strong> Top 3 globally³</td>
</tr>
<tr>
<td>• Capacity: ~260kt/a¹</td>
<td>Sports/leisure 4%</td>
<td><strong>Main competitors:</strong></td>
</tr>
<tr>
<td>• Employees: ~1,500</td>
<td>Packaging 7%</td>
<td>– BASF</td>
</tr>
<tr>
<td>• Customers: &gt;600</td>
<td>Construction 8%</td>
<td>– DuPont</td>
</tr>
<tr>
<td><strong>Product groups</strong></td>
<td>Textile 9%</td>
<td>– DSM</td>
</tr>
<tr>
<td>• Intermediates</td>
<td>E&amp;E 14%</td>
<td>– Solvay</td>
</tr>
<tr>
<td>• High-tech plastics</td>
<td>Others² 23%</td>
<td></td>
</tr>
<tr>
<td>⚫ Durethan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>⚫ Pocan²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>⚫ HiMet²</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; service package</td>
<td></td>
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</tr>
</tbody>
</table>

PA: Polyamide; PBT: Polybutyleneterephthalate; ¹ Compounding capacities, incl. Gastonia, USA; ² For applications like durable household articles, machinery parts, etc. and intermediates; ³ Compounds market share

Competitive advantage based on strong value chain combined with high-end engineering know-how

LANXESS’ value chain

<table>
<thead>
<tr>
<th>Raw materials</th>
<th>HPM Intermediates</th>
<th>High-tech plastics</th>
<th>Engineering know-how</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚫ Cyclohexane</td>
<td>⚫ Caprolactam</td>
<td>⚫ Durethan³</td>
<td>Expertise for all</td>
</tr>
<tr>
<td>⚫ Sulfur</td>
<td>⚫ Glass fibers</td>
<td>⚫ Pocan²</td>
<td>stages of advanced</td>
</tr>
<tr>
<td>⚫ Ammonia</td>
<td>⚫ HiMet²</td>
<td></td>
<td>component development</td>
</tr>
</tbody>
</table>

Sourcing of raw materials on the global market

Only captive use for caprolactam production

Captive use and external sales of caprolactam and glass fibers

External sales focus

Expertise for all stages of advanced component development

Customers benefit from consistent upstream-integration
New polymerization plant strengthens value chain and creates a leading world-scale “Verbund”

World-scale “Verbund”
- New world-scale PA6 polymerization train in Antwerp to serve captive demand for high-tech plastics production in growth regions
  - Investment: €75 m
  - Capacity: 90kt
  - Start-up: Q1 2014
- New caprolactam / PA6 “Verbund” as combined asset on one site further improves economies of scale

Strong intermediates base serves global compounding network

Strong setup to serve global markets

Europe as the key base
- Key intermediates for HPM high-tech plastics are bundled in Europe
- Antwerp, Belgium as HPM base for intermediates to serve global compounding plants
- Strong logistic position of Antwerp site with direct access for deep sea barges

* Under construction
Global setup with local development centers ensures proximity to customers

2010
- Hamm-Uentrop, DE
- Krefeld-Uerdingen, DE
- Pittsburgh, US
- Wuxi, CN

2013/2014
- Hamm-Uentrop, DE
- Krefeld-Uerdingen, DE
- Pittsburgh, US
- Wuxi, CN
- Jhagadia, IN
- Gastonia, US
- Hong Kong, CN
- Porto Feliz, BR*

* Under construction

Growing captive use of key intermediates supports strategy of increasing focus on high-tech plastics

**External sales split**
- Intermediates: ~40%
- High-tech plastics: ~60%

**Targeted high-tech plastics compounds**
- ~80%

- Focus on high-tech plastics:
  - Additional compounding plants foster improved sales mix towards high-tech plastics
- A knowledge leader in high-tech plastics compounds
- Technology competence based on continuous product and application development

Source: LANXESS estimates
HPM’s value proposition combines materials and high-end engineering know-how at its best

Expertise for all stages of advanced component development

- **Material development:** Tailored material solutions
- **Concept development:** Leading in lightweight technology developments
- **Computer aided engineering:** Top-notch simulation methods
- **Part testing:** State-of-the-art testing facilities
- **Processing:** Development of material process combinations for new applications

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**Agenda**

- HPM overview – Strong global business setup
- **Growth driven by innovative lightweight solutions**
- Innovation secures future growth
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Growth for lightweight solutions is driven by global climate challenges

**Initiatives for CO₂ reduction**

**EU Energy Efficiency Plan**
- Increasing energy efficiency to boost sustainable growth and competitiveness
- EU strategy focused on
  - enforcement of existing legislation
  - development of innovative solutions

**Key objectives for 2020** (compared to 1990)
- Cutting energy consumption by 20%
- Reducing annual greenhouse gas emissions by 740 m tons
- Cutting energy costs by €100 bn per year

**EU objective to lower CO₂ emissions for new vehicles**
- 160 g/km in 2006
- 120 g/km in 2012
- 95 g/km in 2020


Lightweight solutions support reduction of road-traffic-related CO₂ emissions

**Global production of vehicles**

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2010</th>
<th>2012e</th>
<th>2015e</th>
<th>2020e</th>
</tr>
</thead>
<tbody>
<tr>
<td>[m units]</td>
<td>100</td>
<td>120</td>
<td>135</td>
<td>150</td>
<td>160</td>
</tr>
</tbody>
</table>

**Composition of materials in car production**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[% weight]</td>
<td>93</td>
<td>88</td>
<td>86</td>
<td>85</td>
<td>82</td>
<td>75</td>
</tr>
</tbody>
</table>

Source: JD Power 2012; Polymotive; PlasticsEurope; LANXESS estimates; * Vehicles: passenger cars and light duty trucks

Strong increase in vehicle production especially driven by BRICS countries

Increasing share of plastics in automobiles is driven by goals to reduce weight and CO₂ emissions

Source: JD Power 2012; Polymotive; PlasticsEurope; LANXESS estimates; * Vehicles: passenger cars and light duty trucks
High-tech plastics growth driven by “Green Mobility” trend and Asian market

Regional demand split 2012e* [kt units]

- North America: 21%
- Asia-Pacific: 41%
- EMEA (excl. Germany): 3%
- Latin America: 3%
- Germany: 14%

Market development

- CAGR (2012-2017)** ~5%
  - Asia-Pacific ~7%
  - Germany ~5%
  - EMEA (excl. Germany) ~4%
  - North America ~4%
  - Latin America ~3%

Main growth drivers

- Vehicle weight reduction for lower fuel consumption, CO₂ emission (“Green Mobility”) and higher safety
- Growing car demand, especially in BRICS and other developing areas
- Growth of electrics & electronics industry driven by innovation and availability to more people

HPM high-tech plastics enable lightweight solutions for “Green Mobility”

High-tech plastics growth in cars*

- ~78 m
- 14kg/ unit
- ~116 m
- ~22kg/ unit

100kg weight reduction cuts down CO₂ emissions by up to 10g CO₂/km, which is 40% of the gap to close until 2020

* LANXESS estimates; High-tech plastics; ** PCI Nylon 2012 and LANXESS estimates; estimated growth rates for PA6, PA66 and PBT

High-tech plastics solutions in cars

- Spare wheel well
- Roof frames
- Airbag housings
- Module carrier
- Gas tank carrier
- Battery housing carrier
- Battery cell holder
- Steering coil
- Pedals / pedal brackets
- Cross car beams
- Front ends
- Brackets

* LANXESS estimates
HPM – Enabler of high-tech plastics solutions

HPM’s high-tech plastics developments contribute to weight reduction in cars

<table>
<thead>
<tr>
<th>Frontend 1st generation</th>
<th>Frontend 2nd generation</th>
<th>Frontend 3rd generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>System carrier: 1997</td>
<td>In-mold assembly: 2005</td>
<td>High-modulus materials:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Since 2012 in serial production</td>
</tr>
</tbody>
</table>

- Steel sheet: 1.5mm thickness
- Single steel sheet supported and functionalized by overmolded high-tech plastics
- Glass fiber content in plastics: 30%*

- Aluminium / steel sheet: 1.2 / 0.8mm thickness
- Several smaller sheets are mounted with overmolded high-tech plastics
- Glass fiber content in plastics: 30%*

- Aluminium / steel sheet: 1.0 / 0.7mm thickness
- Sheets are overmolded with less but extremely stiff high-tech plastics
- Glass fiber content in plastics: 60%*

| Weight reduction vs. steel: ~30% | Weight reduction vs. 1st generation: ~15% | Weight reduction vs. 2nd generation: ~15% |

* Weight percentage
HPM creates first frontend with composite sheets for series application

Audi A8 frontend material combination:
- Upper part: Aluminium sheet / high-tech plastic Durethan®
- Lower beam: Composite sheet (1mm thickness)
  - Composite sheet consists of 60% continuous glass fiber woven fabric embedded in high-tech plastic Durethan®
  - Composite sheet / Durethan® with excellent mechanical properties, e.g. high strength and stiffness

Audi A8 frontend weight reduction:
- Lower beam with 20% weight reduction compared to Aluminium

Acquisition of Bond-Laminates strengthens HPM market position for lightweight solutions

Bond-Laminates overview
- A leading provider of continuous fiber-based composite sheets (trade name: TEPEX®)
- Applications: Automotives, sports, electronics
- Production site in Germany (Brilon)
- Own laboratory for material and prototype development
- Successful projects with LANXESS for the automotive industry since 2006

Acquisition rationale
- Serving lightweight trend with innovative composite sheet technology
- Forward-integration of high-tech plastics value chain
- Diversifying customer base
- Expanding composite sheet technology into growth markets

* CAE: Computer Aided Engineering
High Performance Materials – The high-tech plastics solution provider

- Innovator of lightweight solutions
- Premium applications for “Green Mobility”
- Leading-edge engineering know-how
- Strong customer relations and proximity

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“Green Mobility” as underlying trend for new application fields

Innovation – First brake pedal with composite sheet for series production

- Development project: Brake pedal
  - Co-operation with ZF Friedrichshafen, a leading automobile supplier for drive technology and chassis
  - New brake pedal with ~50% weight reduction compared to standard steel pedal
  - Additional benefits include: Function integration, reduction of process steps, no corrosion protection needed, easy recycling
  - Start of series production: End of 2013 (in premium cars)

- Evolution of brake pedals
  - Steel: 794g
  - Plastic metal hybrid: 526g
  - Composite sheet: 355g

- Mounted pedal block
Innovation – New bond technology for plastic metal hybrid components

**Research project: Adhesive bond technology**
- Joint research project funded by the German government (Federal Ministry of Education and Research)
- New bonding technology targets higher performance level to gain further weight reduction
- Project objective: ~30% weight reduction compared to standard hybrid components
- Application areas: Crash relevant components, e.g. crash boxes

**Current technology**

| Metal | + | Polymer | → Mechanical fixing |

**New adhesive bond technology**

| Metal | + | Polymer | Primer / glue |

Innovation – New flame retardant high-tech plastic generation for solar power systems

**Terminal block for solar power conditioner**
- Co-operation with Osada, Japan
- Power conditioners convert electric power of solar panels (direct current (DC) to alternating current (AC))
- Requirements of terminal blocks: excellent flame retardancy and long-term UV resistance
- LANXESS’ latest “green” (non-halogenated) flame retardant Pocan® generation

HPM with trend-setting solutions for e-mobility

E-mobility: Lightweight solutions and electrics & electronics applications

<table>
<thead>
<tr>
<th>Lightweight solutions</th>
<th>Electrics &amp; electronics applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Functionally integrated lightweight construction</td>
<td>• Flame retardancy</td>
</tr>
<tr>
<td>• Multi-material design</td>
<td>• Electric resistivity / insulation</td>
</tr>
<tr>
<td>• Composite technology</td>
<td>• Mechanical performance</td>
</tr>
<tr>
<td></td>
<td>• Easy processability</td>
</tr>
</tbody>
</table>

Source: www.motortrend.com (http://www.motortrend.com/features/auto_news/2011/12/03/sorting_out_the_chevy_volt_fire_fiasco/photo_02.html)

* HV=High Voltage

HPM with strong knowledge base to support future e-mobility applications
High Performance Materials – A global player for lightweight solutions

- **Global reach**
  - Strong global market position
  - Further globalization of production network

- **Strong growth setup**
  - Expanding setup in key growth markets
  - Strong value chain and broad product portfolio
  - Acknowledged value provider

- **Innovation leader**
  - Know-how and concept competence
  - Excellent customer relationships
  - Fast and flexible innovation provider