Panel discussion *Global Composites*

SAMPE, 6-9 May 2013
Long Beach, CA, USA
Panel discussion Global Composites

Richard Degenhardt
German Aerospace Center (DLR)

Average market growth rate 15%

- Industrial
- Aerospace
- Sports goods

Year:
- 2006: PC chassis, CNG tanks
- 2007: Civil Engineering
- 2008: Golf Shafts, Tennis Rackets
- 2009: Automotive, Aircraft structural components
- 2010: Heavy goods & track vehicles
- 2011: Wind power
- 2013: Offshore oil field components, Marine vessels
- 2015: Airbus A350
DLR
German Aerospace Center

- Research Institution
- Space Agency
- Project Management Agency
Total income 2010 – Research, operations and management tasks (excluding trustee funding from the Space Administration / DLR Project Management Agency): € 745 Mio.

- Space Research and Technology: 308 Mio.
- Aeronautics: 205 Mio.
- Transport: 53 Mio.
- Space Administration / DLR Project Management Agency: 44 Mio.
- Other income / earnings: 104 Mio.

All values in € million.
Institute of Composite Structures and Adaptive Systems
Director: Prof. M. Wiedemann
Multifunctional Materials
Dr. P. Wierach
We increase the ability of the materials!

- Fiber- and nanocomposites
- Smart materials
- Structural health monitoring
- Material characterization

Structural Mechanics
Dr. A. Kling
With high fidelity to virtual reality for the entire life cycle!

- Global design methods
- Stability and damage tolerance
- Structural dynamics
- Thermal analysis
- Multi-scale analysis
- Process simulation

Composite Design
Dr. C. Hühne
Our design for your structures!

- Design and Sizing
- Structure concepts and assessment
- Multi-functional structures
- Shape-variable structures
- Hybrid structures
Composite Technology
Dr. M. Kleineberg
Tailored manufacturing concepts

Adaptronics
Dr. H. P. Monner
The adaptronics pioneers in Europe

Composite Process Technology
Prof. Dr. M. Wiedemann
Research with industrial dimension

- New technologies for manufacturing
- Hybrid manufacturing
- Assembly
- Repair
- Process automation

- Simulation and demonstration of adaptive systems
- Active vibration control
- Active noise control
- Active shape control
- Autarkic systems

- Automated FP und TL
- Online QA within autoclaves
- Automated manufacturing for mass-production
- Simulation methods for maximum process reliability and process assessment
Applied Research | Our Foci of Product Oriented Research

Focus Fuselage Technologies | Dr. T. Wille
- Fuselage design
- Large cut-outs
- Manufacturing technologies

Focus High Lift | M. Kintscher
- Flexible leading edge
- Morphing of high lift systems
- Structural integration of active flow control

Focus Special Structures | M. Hanke
- Safety relevant aeronautical structures and UAVs
- Multifunctional composite structures
- Demonstration of design and technology
Applied Research | Our Foci of Product Oriented Research

Focus
Space | M. Straubel

Focus
Transport | J. Nickel

- Lander structures
- Deployable space structures
- Upper stage
- Next generation train
- Novel vehicle structures
DLR Centre for Lightweight Production Technology (ZLP)

ZLP Site Stade
Prof. Wiedemann, Dr. Kruse

ZLP Site Augsburg
Prof. Voggenreiter, Dr. Dudenhausen

Head of ZLP: Dr. Kruse
Example: Simulation tool chain
"Stability" is the relevant design criterion for most parts of launcher structures. The current design guidelines are from 1968 and developed for metallics. There are no guidelines for composites which allow exploiting all reserve capacities.
CFK VALLEY STADE

regional network - global impact

Prof. Dr.-Ing. Axel Herrmann,
Patrick Markert,
Helge von Selasinsky
Infrastructure of the CFK-Valley Stade

CFK NORD large scale research centre

Technology

Service

InfoPoint

Campus

Recycling

Convention
Competencies along the entire value chain
[96 members]
## Lightweight potential of reinforced plastics in the mobility sector

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>operating time</th>
<th>ecological benefit</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airplane</td>
<td>~ 60,000 h</td>
<td>1 kg less weight saves 3 t of kerosene</td>
<td>A380 max. take off weight: 560,000 kg!</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,35 €/l -&gt; 4050,- € per kg</td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>~ 6,000 h</td>
<td>100 kg less weight leads to 0,35 -0,5 l / 100km</td>
<td>Golf I: 780 kg</td>
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<tr>
<td></td>
<td></td>
<td>less fuel consumption</td>
<td>Golf VI: 1142 kg</td>
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<tr>
<td></td>
<td></td>
<td>-&gt; 8,8-12,5 g/km less CO₂ emission</td>
<td>+ 25%</td>
</tr>
<tr>
<td>Train</td>
<td>~ 75,000 h</td>
<td>Reduction of journey-time HH to M: up to 20 Min.</td>
<td>Significant reduction of energy consumption</td>
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<td></td>
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<td>e.g. on subway trains</td>
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<tr>
<td>Truck</td>
<td>~ 1,000,000 km</td>
<td>Lightweight trailer saves up to 25 % fuel</td>
<td>270,000 l instead of 350,000 l diesel</td>
</tr>
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