Industry and research are working shoulder to shoulder in innovation

Automotive Congress 2018 | Crossing Borders | May 23rd, 2018, Eindhoven

Dr.-Ing. Michael Emonts
Dr.-Ing. Kai Fischer
Dr.-Ing. Michael Effing
Inspire your employees and customers at one of Europe’s leading Technical University

RWTH Aachen
- Founded in 1870
- 260 research institutes
- 540 professorships
- 5,373 scientists
- 45,373 students, 7,184 graduates in 2016
- 2 clusters of excellence:
  - “Integrative Production Technology for High-Wage Countries”
  - “Tailor-Made Fuels from Biomass”

New RWTH Aachen Campus
- 2 areas with 800,000 m²
- Emphasis on production technology:
  - 62 professorships
  - 12,050 students, 2,600 employees
- Already signed industrial collaborations:
  - 120 international and national companies
  - 30 research institutions
AZL: Lightweight expertise along the value chain
From carbon-fiber production to product testing

9 institutes, dealing with composite-based lightweight topics
>750 scientists
1,100 student workers
~ 100 public funded lightweight projects in parallel
Introduction

Video: Composite Competences in Aachen
AZL Premium Partnership
Holistic access to RWTH capabilities

RWTH Aachen Campus

Future Competitiveness
Talents  Technology Innovations  Customers & Partners
Campus Project of RWTH – One of the largest European Research Landscapes

6 out of 16 new Clusters at Campus:

- Bio-Medical Engineering
- Production Engineering
- Heavy Duty Drives
- Photonics
- Smart Logistics
- Sustainable Energy

Campus Melaten

Campus West
AZL Infrastructure News

Cluster Building “Integrative Production Technology”

Investor: IMMOFINANZ Group, Vienna
Leasehold space: 11,800 m²
Gross Floor Area: 32,000 m²
Adjacent and surrounding areas: 3,500 m²
Investments: approx. € 60m
AZL Partner Offices together with AZL Team

Production Engineering Cluster
Co-Working Space at new AZL Center
Our Proposal

Exclusive usage of one office for Premium Partners

- Fully equipped for two employees (min. 16 m²)
- All-year usage of one exclusive office
- Usage of meeting rooms
- Usage of communication zone

Shared office for Business Partners

- Fully equipped
- Office usage on 4 days a month
- Meeting rooms for 2 half-day meetings a month
- Usage of communication zone
AZL Partner Companies
Effective: May 2018
AZL Aachen Partner Network:
More than 80 Partner Companies from 21 Countries

AZL Aachen GmbH in cooperation with AZL of RWTH Aachen University
www.azl-lightweight-production.com

May 23rd, 2018
Our co-location at the RWTH Aachen Campus increases our accessibility and visibility towards the institutes. Since we are represented with a Campus office and real faces, we tripled the number of active projects and lifted the quality of collaboration to the next level.

Ernst A. Poppe, Business Development Manager Performance Materials at DuPont
Innovation Strategy of AZL
Composite Competences along the Value Chain

Using the Aachen Competences along the Value Chain

Lightweight Materials & Design
- Raw Materials
- Semi-finished Materials
- Composite/ Multimaterial Systems
- Product Design

Production Technology
- Manufacturing Technologies
- Production Machines/ Tools
- Quality Assurance
- Production-/ Cost Planning

= Integrative Approach

Research on Interdependencies:

Integrated Parts based on Multimaterial Systems

Process Combinations

Hybrid Production Machines

Integrated „Intelligent“ Process Chains
Innovation Strategy of AZL
Composite Competences along the Value Chain

Technology-Push

Market-Pull

Demands from the Industry

Innovations lead to:
- Efficient material usage
- Efficient processes
- Efficient production systems
- Increased performance-cost-ratio

Benefits:
- Short cycle times
- High quality
- Reproducibility
- Cost efficiency

Using the Aachen Competences along the Value Chain

Innovations
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AZL Partnership

Benefits

- Joint Business Development
- Cost-Sharing in R&D
- Open Innovation & Networking
- Access to Pool of Talents
- Co-Location and Access to RWTH Aachen University
AZL Partnership
Services

Annual Partner Meeting
Extended Matchmaking
Market Intelligence
Co-Working Space
Human Resources

Networking
Workshops & Workgroups
Joint Partner Projects
Acquisition of Public Funding
Marketing, PR

Learn more at booth 3
AZL Partnership
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### AZL Industrial Workgroups

#### Technology- and Product-oriented Collaboration

<table>
<thead>
<tr>
<th>Technology-oriented Workgroups</th>
<th>Product-oriented Workgroups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hybrid Thermoplastic Composites</strong></td>
<td><strong>Composite Pipes and Vessels</strong></td>
</tr>
<tr>
<td>- 9 Meetings since 2014</td>
<td>- 5 Meetings since 2015</td>
</tr>
<tr>
<td>- Over molding of TFRP, process combinations</td>
<td>- Customer pain points, cost reduction, market trends, standards</td>
</tr>
<tr>
<td><strong>High-Performance SMC</strong></td>
<td><strong>Composites in Buildings and Infrastructure</strong></td>
</tr>
<tr>
<td>- 5 Meetings since 2016</td>
<td>- Established in Jan. 2018</td>
</tr>
<tr>
<td>- Carbon fiber, continuous glass fiber, new resins, reinforcements</td>
<td>- Process and manufacturing, materials, fire safety, norms</td>
</tr>
<tr>
<td><strong>High-Speed RTM Matrices</strong></td>
<td></td>
</tr>
<tr>
<td>- 7 Meetings since 2014</td>
<td></td>
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<tr>
<td>- Model material data sheet, new projects: testing, sandwich/hybrids, …</td>
<td></td>
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</tbody>
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Joint Market and Technology Study
High-Performance SMC

Motivation and Aim

- Evaluation of the potential of a next generation of SMC in industrial applications
- In-depth knowledge on SMC applications and technologies, key challenges and technological solutions for establishing High-Performance SMC
- Initiated by Workgroup High-Performance SMC

Status

- Study definition together with OEMs BMW, General Motors, MAN Truck & Bus AG, Volkswagen AG and Toyota, Jaguar Landrover
- Open to companies inside and outside the Partner Network
- Start: September 2017, duration: 12 months
Joint Market and Technology Study on HP-SMC
Key deliverables of the 3 stages

Stage 1: Definition, status quo analysis and research of technological state of the art

- Analysis of the **state of the art of HP-SMC technology** (materials, design, processing, simulation and testing)
- Representative **use cases, production scenarios & value chains** for different fields of application

Stage 2: Detailed technology studies and derivation of fields of action

- **FMEA** for prioritised application and production scenarios
- Evaluation of existing technologies, their readiness level and demonstration of best practice solutions
- Definition of **remaining key challenges and fields of action** along the value chain to establish HP-SMC

Stage 3: Scenario development for next-level solutions

- **Scenario development** to solve the key challenges by evaluation of next-level solutions from other technology areas
- Overview of **markets, value chains and providers** for such next-level solutions as basis for new business opportunities
AZL Partnership Statements

AZL’s way to work internationally and open minded, makes me feel welcome every time I come to Aachen. I do appreciate the broad background available in Aachen and the effective and pragmatic approach of the Joint Partner Projects.

Thierry Renault, Composite Technologies – Manager of Partnerships at Faurecia Clean Mobility
AZL Partnership

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Exemplary Project “OPTO-Light”
Hybrid Thermoset/Thermoplastic Composites

- **Project Objectives**
  - Combination of continuous fiber-reinforced thermosets with long fiber-reinforced thermoplastics
  - Fully integrated production cell based on injection molding machine
  - Laser sublimation for local exposing of fibers
  - Multifunctional laser system with closed-loop process control
  - Cycle time < 3 min
  - Reduction of part number ≈ 80%

- **Paradigm shift**
  - High functionality for structural car body components made of CFRP in 1 shot

- **Duration**
  - 02/14 - 01/17

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Source: BMW Group
BMBF-Project OPTO-Light
Overview about System Development

Near-net shape CFRP part

BMW i3 Life Modul

Rib (PA6-GF30)  Screw dome  3d part (CF-Epoxy)

OPTO-Light Demonstrator

470 mm

Injectoin moulding (Thermoplastic)
Component carrier (Turning plate)
Horizontal prepreg compression moulding (Thermoset)

In-mold surface pre-treatment (Interacting laser system)

Manufacturing cell based on IMM with turning plate

Novel mold technology with sensor package (p,T,R,η)

Optical inline measurement

Robot-guided 3d laser pretreatment

Integrated sensors for depth and temp.

Demonstrator part in the outside demo zone
AZL Partnership Services

- Annual Partner Meeting
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Learn more at booth 3
Market Intelligence
Composite Business Cases for Market Intelligence

- **9 Business cases** of selected lightweight components each year
- **3 business cases** in each web conference:
  - Market numbers and facts and figures on component
  - Process chain for the corresponding production
  - Processes, process steps (e.g. cycle times)
  - Allocation of resources (e.g. materials and equipment)
  - Analysis of process cost structure and cost drivers
  - Discussion of results
- Cost Analysis realized by »OPLYYSIS« – Process Chain Costing Tool
Market Intelligence
Composite Business Cases for Market Intelligence

#1: Bonnet
#2: Tailgate
#3: Pressure Vessel
#4: Automotive Underbody
#5: Wind Turbine Blades

#6: Riser
#7: Aircraft Trolley
#8: Leaf Spring
#9: Door Module Carrier

Download for Business & Premium Partners at AZL Partner Section
AZL Year 2017

We invite you to join our vital Network

Learn more at booth 3

5 Workgroups

9 Workgroup Meetings

26 Project Meetings

85 Partner Companies

More than 400 Participants in total

20 new Partner Companies

3 running Joint Partner Projects
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