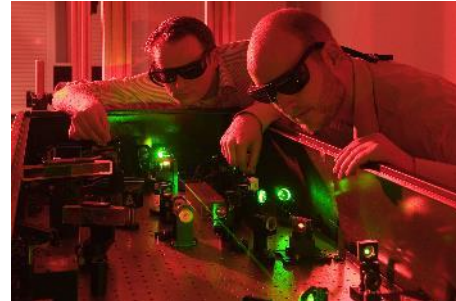
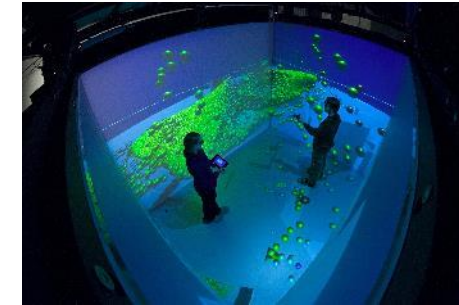


AZL Partnership

Collaboration and Excellence in Lightweight Production

AZL Aachen GmbH in cooperation with



Copyright: Peter Winandy, Andreas Schmitter (graduates)

### Key facts on the RWTH Aachen University

- 260 research institutes
- 540 professorships
- 5.373 scientists
- 45.37 students
- 7.184 graduates in 2016
- 2 clusters of excellence:
  - "Integrative Production Technology for High-Wage Countries"
  - "Tailor-Made Fuels from Biomass"



# Lightweight Production Technologies: From Carbonization to Quality Metrology

## Composite-based Lightweight Research along the entire Value Chain at RWTH Aachen Campus

Process Chains for Hybrid Composite Materials
Material Development and Processing Technologies
Production Technologies
Machine Tools and Measurement Technologies
Laser Technology
Automotive Science and Engineering
Fiber & Textile Technology
Bonding Technology
Lightweight Design



- 9 institutes dealing with composite-based lightweight topics
- +750 scientists
- 1,100 student workers
- more than 100 public funded lightweight projects in parallel



Aachener Zentrum für integrativen Leichtbau



INSTITUT FÜR KUNSTSTOFFVERARBEITUNG  
IN INDUSTRIE UND HANDWERK AN DER RWTH AACHEN



Fraunhofer  
IPT



WZL | RWTH AACHEN UNIVERSITY



Fraunhofer  
ILT



ika | RWTH AACHEN UNIVERSITY



ITA | RWTH AACHEN UNIVERSITY



ISF | RWTH AACHEN UNIVERSITY



Institut für Strukturmekanik und Leichtbau | RWTH AACHEN UNIVERSITY

### About AZL and its Research Partners

RWTH Aachen University is one of the **worldwide leading universities in the field of production technology.**

The Aachen Center for integrative Lightweight Production (AZL) of RWTH Aachen consolidates the lightweight expertise of eight more Partner Institutes with 750 scientists on the RWTH Aachen Campus covering **research and development along the entire value chain for composite production.**

» Click here to watch the video summarizing the competences and equipment of the 9 AZL Partner Institutes

# Get your company in good company

Our Industrial Partners: More than 80 Partner Companies from 21 Countries



## The industrial AZL Partner Network

The AZL builds an international partner network between more than 80 international companies and the institutes on the RWTH Aachen Campus, all involved in lightweight production.

### Key facts on the AZL Partner Network

- More than 80 companies
- 21 different countries
- Entire Value chain: OEMs, Tier 1, Tier 2, molder, system and machine developer, material supplier, service provider
- From start-ups to multi-national corporations
- Sector-independent



# Vital Collaboration within the AZL Partnership

## What we do together



Joint Business Development



Open Innovation & Networking



Cost-Sharing in R&D



Access to Lightweight Talents



Access to RWTH Aachen Infrastructure

## Activities of the last year



# AZL Partnership Services

## Our offer to you



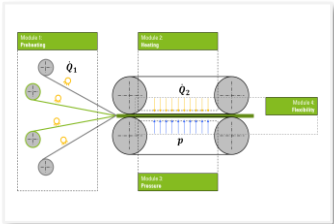
Annual Partner Meeting



Workshops & Workgroups



Networking Events



Joint Partner Projects & Studies



Composite Business Cases

Conference Overview



Human Resources



Acquisition of Public Funding



Marketing, PR



Co-Working Space

### Joint Partnership Activities

The +80 AZL Partner Companies and 9 AZL Partner Institutes closely work together in pre-competitive research and development, in joint business development, marketing and networking.



# Some Examples: Access to RWTH Aachen Infrastructure

Your Co-Location to work with Experts and Equipment located at the RWTH Aachen Campus



AZL is located in the Production Engineering Cluster on RWTH Aachen Campus. © Campus GmbH/Steindl

## RWTH Aachen University in Figures

- 44,517 Students in Total
- 7,184 Graduates
- 9,053 Publications
- 900 Mio. € Budget
- 260 Institutes
- 540 Professors

Your individual Access to RWTH Capabilities with the AZL Partnership

Talents

Exclusive Office Space

Technology Innovations

Companies & Institutes at the Campus

Regular Meetings

» 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**

# Our established Industrial Workgroups

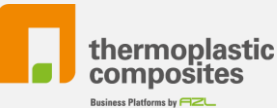
## Open Innovation and Networking

### Technology-oriented Workgroups



#### Hybrid Thermoplastic Composites

- 9 Meetings since 2014
- Over molding of TFRP, process combinations
- Automotive and aerospace applications



>> [www.tp-composites.com](http://www.tp-composites.com)



#### Advanced Thermoset Production

- 9 Meetings since 2014
- Model material data sheet, new projects: testing, sandwich/hybrids, ...
- Buildings & infrastructure applications



>> [www.high-speed-rtm.com](http://www.high-speed-rtm.com)



#### High-Performance SMC

- 10 Meetings since 2016
- Carbon fiber, continuous glass fiber, new resins, reinforcements
- Automotive and aerospace applications



>> [www.high-performance-smc.com](http://www.high-performance-smc.com)

### Product-oriented Workgroups



#### Composite Pipes & Vessels

- 8 Meetings since 2015
- Customer pain points, cost reduction, market trends, standards



#### Composites in Buildings & Infrastructure

- 3 Meetings since 2018
- Established in Jan. 2018
- New applications, standards & norms, fire safety, materials process and manufacturing

### AZL Industrial Workgroups

In five different workgroups, the AZL Partner Companies are working and exchanging on pre-competitive topics to drive composite and lightweight production.

#### Missions of AZL Workgroups



Technology-Oriented Networking



Identification of pre-competitive Topics



Initialization of Projects



Impulses for Research Institutes



Building Trust in Technology



+ = Open to join

## Your Benefits

- Detailed, pre-competitive investigation of lightweight materials, systems or processes
- Direct influence on study process
- Contact to a broad network of industrial players
- Combination of technical knowhow and market intelligence
- Hardware on-site for realizing resulting project ideas
- Cost-effective budget based on joint cost sharing

## Some Examples: Cost-sharing in R&D

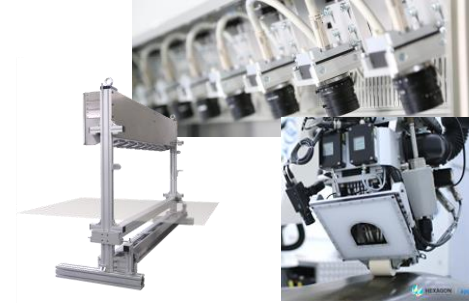
### Our Joint Partner Projects and Studies



Inductive Double-Belt Press –  
Follow-up Project



Ultra-Fast Manufacturing of Tailored  
Composite Blanks – Follow-up Project



Non-Destructive In-line  
Measurement

### Artificial Intelligence in Design and Manufacturing



### Next Generation Mobility Solutions



» 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**

# Some Examples: Matchmaking and Networking Activities

## Networking Events and Annual Partner Meeting 2018

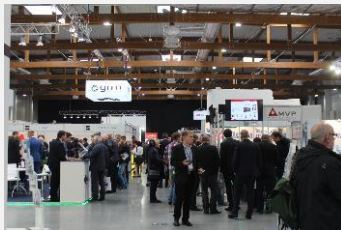
» I think that the IAA event was one of the most informative I have ever participated for the seniority of the presenters, the relevance and the mix of segments. We had an overview of the composite needs in the context of the overall car requirements and not only of the lightweight or material department.

**Gino Francato, Global Business Manager Composites at SABIC**



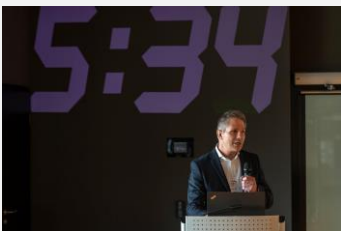
Executive Networking Event at IAA Automotive Show (September 2017)

- +50 high-level Participants (Presidents and VP, Executives & 12 Senior Managers)
- Keynotes from OEMs and Tier 1 (Daimler, Ford, NIO, LG Hausys)
- Guided Visits at IAA Show



Composite Networking Event in Krakow, Poland (October 2017)

- Connecting Polish companies and AZL Partners as associated partners and customers
- Presentations with Insights into the Polish market for composites and Poland’s industrial landscape
- Guided Visits of Composite Company & Trade Fair



5<sup>th</sup> Annual Partner Meeting 2018 (June 2018)

- 130 Participants on 2 Days
- 17 “Speed Dating” Presentations and 10 AZL Updates on Workgroups and Projects
- Networking Dinner in Aachen Historic City
- Campus Session with Guided Tours to RWTH



# Some Examples: Market Intelligence through Composite Business Cases

Smart Facts and Process Chains for Composite Components – discussed in Web Conferences



#1: Bonnet



#4: Automotive Underbody



#7: Aircraft Trolley



#10: Front End Carrier



#13: Battery Casing



#2: Tailgate



#5: Wind Turbine Blades



#8: Leaf Spring



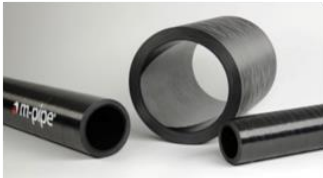
#11: Automotive Rear Wall



#14: Additive Manufacturing



#3: Pressure Vessel



#6: Riser



#9: Door Module Carrier



#12: Hockey Stick



#15: Center Armrest

## Scope of Business Case Analysis

- Joint selection of potential components
- 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

## Your Benefits

- Easy participation through web conferences
- Fast insights into applications and the production of composite components
- Proposal of components

# Some Examples: Conference Overview

## Listing and filter options of lightweight conferences

- Aim: Targeted participation in conference
- Filter options according to following criteria:
  - Addressed markets
  - Material groups
  - Presentation profile: Keynotes, technical industrial or scientific
  - Organizer's profile: Commercial, industrial association, scientific
  - Conference language and location
  - Additional activities
- Updated quarterly

Name of event	Scope	Lightweight focus														Start	End	Frequency	Location	Organizer	URL
		Lightweight focus	Market: Chassis & Transmission	Market: Chassis, Gas	Market: Vehicle & Infrastructure	Market: Renewable Energy	Market: Consumer Goods, Luxury	Market: Maritime	Market: Aerospace	Market: Industry	Market: Infrastructure	Market: Energy	Market: Chemicals	Market: Electronics	Market: Other						
<b>Lightweight Chassis and Body Design (2nd International Conference)</b>	Present the latest innovations in terms of lightweight chassis and component applications, find the best material combination to manufacture multi-material lightweight chassis. Optimal design for developing lightweight transmission for truck and bus, innovative tool forming to challenge for developing lightweight chassis	■	■													February 16, 2016	February 17, 2016	annual	Kongjuhl Bristol Berlin, Germany	IOPC GmbH	<a href="http://www.lightweight-chassis.com/">http://www.lightweight-chassis.com/</a>
<b>ICILSM 2016 - 1st International Conference Impact Loading of Structures and Materials</b>	Material characterization including failure (lightweight alloys, composites, polymers, high strength steels, foams, ceramics, biological materials), Structural failure, energy absorbing systems and crashworthiness, Vehicle safety (automotive, railway, aerospace, motorcycle and bicycle, naval), Impact biomechanics, Ballistic impact, Experimental techniques, Theoretical models, Numerical analysis	■	■													May 22, 2016	May 26, 2016	annual	Palazzo di Torino, Italy	Department of Mechanical and Aerospace Engineering (DIEHAS)	<a href="http://www.icilsm2016.org/">http://www.icilsm2016.org/</a>
<b>LIMA - The Lightweight Design Exhibition</b>	Lightweight design for a multitude of different sectors; Materials and structural elements (Metals, polymers, wood, paper, fiberboard, ceramic, technical textile, composites, fiber composites, semi-finished products, structural elements, components, modules); Production processes and production engineering	■					■									May 31, 2016	June 2, 2016	biennial	Messe Chemnitz, Germany	O'Chemnitz Veranstaltungszentrum GmbH	<a href="http://www.lima-chemnitz.de/de/Haupt_119.html">http://www.lima-chemnitz.de/de/Haupt_119.html</a>
<b>Thermoplastic Composites for Automotive Conference 2016</b>	Outstanding information on lightweighting, cost reduction through automation and new approaches to automotive production for injection molding and composite fabricators	■	■													June 15, 2016	June 16, 2016		Sukuban Collection Showplace, Michigan, USA	Composites World, Automotive Design & Production and AutoEvent Daily	<a href="http://www.compositesworld.com/event/detail/60481-c2-c199-4b59-af81-61ab21469f45">http://www.compositesworld.com/event/detail/60481-c2-c199-4b59-af81-61ab21469f45</a>
<b>Automotive Thermoplastic Composites Conference</b>	Addressing the aim to produce cost and save manufacturing processes that will adhere to the EU's tough CO2 emission reduction targets set for 2020	■	■													July 5, 2016	July 6, 2016		Renaissance Düsseldorf Hotel, Düsseldorf, Germany	JEC Group	<a href="http://www.jec-composites.com/annual-dgf-international-composites-conference-automotive-thermoplastic-composites-conference">http://www.jec-composites.com/annual-dgf-international-composites-conference-automotive-thermoplastic-composites-conference</a>
<b>Composites in Sport</b>	New material developments for sporting competitive advantages, Testing and certification of composite sporting goods, Sporting infrastructure and facilities, Case studies of performance-enhancing composite in sport, Manufacturing composite sporting goods for consumer mass markets	■					■									November 16, 2016			Hollywell Park Conference Centre, Lancashire, UK	NetComposites	<a href="http://netcomposites.com/conferences/conference.html">http://netcomposites.com/conferences/conference.html</a>
<b>2nd International Composites Congress (ICC)</b>	Composites industry, Aim: opportunities for breakthrough applications using fiber reinforced composites, automated mass production of composites	■					■		■							November 28, 2016	December 29, 2016	annual	Düsseldorf, Germany	Composites Germany	<a href="http://www.composites-congress.de/index.php?option=com_content&amp;view=article&amp;id=124&amp;Itemid=124">http://www.composites-congress.de/index.php?option=com_content&amp;view=article&amp;id=124&amp;Itemid=124</a>
<b>Lightweight Vehicle Conference 2016</b>	Discuss the future of lightweight vehicles and to explore solutions to the EU's tough CO2 emission reduction targets set for 2020	■	■						■							November 30, 2016	December 1, 2016	annual	Dalco Munich Hotel, Munich, Germany	PlasticNews Europe	<a href="http://www.lightweightvehicleconference.com/">http://www.lightweightvehicleconference.com/</a>
<b>Aircraft Composites &amp; Lightweight Materials Conference</b>	New lightweight aircraft designs and innovative approaches of weight saving through function integration, benefit from in-depth analysis of advanced material properties, material mix, thermal behavior, cost challenges and new and new technologies for mass production for aircraft applications	■	■													December 1, 2016	December 2, 2016		Darwin Kongresshotel, Düsseldorf, Germany	JEC Group	<a href="http://www.jec-composites.com/annual-dgf-international-composites-conference-automotive-thermoplastic-composites-conference">http://www.jec-composites.com/annual-dgf-international-composites-conference-automotive-thermoplastic-composites-conference</a>
<b>Automotive Composites (7th International Conference)</b>	New vehicle architecture designs for lightweighting and cost-effective practical automotive applications of lightweight materials, low cost and energy efficient possibilities to build lightweight vehicles through recycling resources	■	■													December 1, 2016	December 2, 2016		Darwin Kongresshotel, Düsseldorf, Germany	JEC Group	<a href="http://www.jec-composites.com/annual-dgf-international-composites-conference-automotive-thermoplastic-composites-conference">http://www.jec-composites.com/annual-dgf-international-composites-conference-automotive-thermoplastic-composites-conference</a>
<b>Cyclotech</b>	Optimizing Racing Bike Performance, Non-destructive Testing and Quality Control of Bike Parts	■				■										December 4, 2016	December 7, 2016	annual	Newport Beach Marriott Hotel & Spa, California, USA	JEC Group and SPE	<a href="http://www.cyclotech.conference.com/">http://www.cyclotech.conference.com/</a>
<b>International Conference on Nanomaterials, Functional and Composites</b>	Nanomaterials, functional and composite materials (Nanomaterials Synthesis and Characterization, Multifunctional Composites, Polymers and Ceramics) Lightweight, Composites as a Replacement for Composite Materials	■					■									January 7, 2017	January 9, 2017	first-time	Hong Kong, China	IONFOM2017 Organizing Committee	<a href="http://www.ionfom.org/index.html">http://www.ionfom.org/index.html</a>
<b>Composites Executive Forum</b>	economic, political and cultural issues and specific impact on composite industry	■					■		■							January 11, 2017	January 12, 2017	every three years	Washington, USA	ACMA	<a href="http://www.acma.com/conference/2017-conference">http://www.acma.com/conference/2017-conference</a>
<b>5th Automotive Lightweight Supply-Chain Symposium 2017</b>	automotive lightweighting, supply chain and procurement management	■	■													January 17, 2017	January 19, 2017	annual	Nürnberg, Germany	Alufaq	<a href="http://alufaq.com/2017-symposium/">http://alufaq.com/2017-symposium/</a>
<b>Future of Polyolefin 2017</b>	Global polyolefin market, feedstock markets & processes development, recycling, application processes	■					■									January 18, 2017	January 19, 2017	annual	Amsterdam, Netherlands	AGI	<a href="http://www.upiagroup.com/2017-polyolefin-conference/">http://www.upiagroup.com/2017-polyolefin-conference/</a>
<b>Processing and Fabrication of Advanced Materials (25th International Conference)</b>	Processing and fabrication of advanced materials, spanning the entire spectrum of metallic, intermetallic, ceramic, ceramic matrix composite, metal-matrix composite, intermetallic matrix composite, advanced polymers and polymer-matrix composites	■					■									January 22, 2017	January 25, 2017	annual	Auckland, New Zealand	The University of Auckland	<a href="http://www.nzpmc25.com/">http://www.nzpmc25.com/</a>



# Be part of the AZL Annual Partner Meeting 2019

One of the most important Meetings of the AZL Network



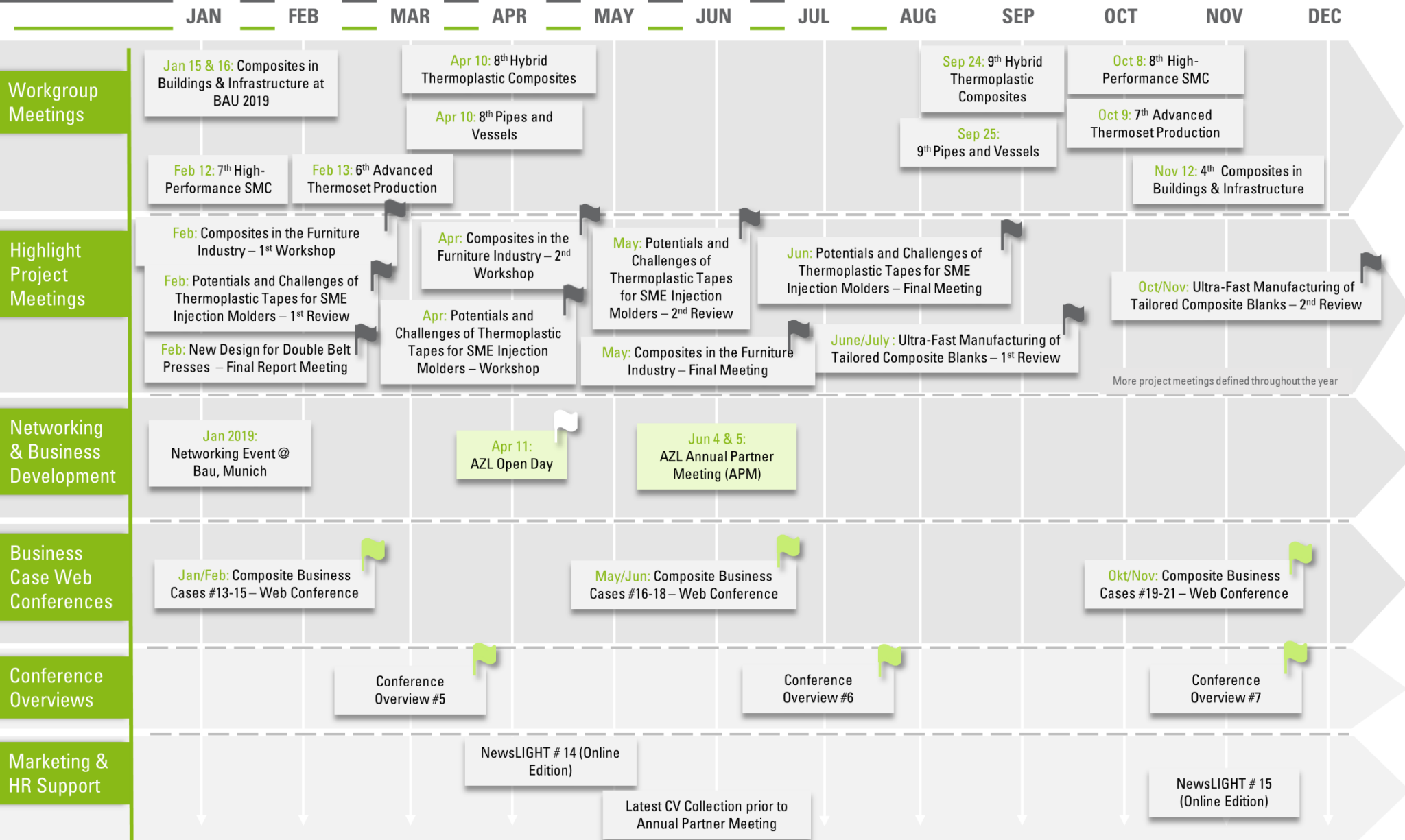
## Program

- Update on running AZL Activities
  - Joint Partner Projects
  - Market & Technology Studies
  - Workgroups
- Co-Definition of future AZL Activities
- Meeting of more than 80 partner companies from 21 countries
- Networking & Knowledge Exchange



## Your Schedule for Networking and Collaboration throughout the year

-  For project partners only
-  For Business & Premium partners only
-  Open to non-partners also



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