INJECTION MOLDING MACHINE MANUFACTURER YIZUMI AT THE RWTH AACHEN CAMPUS

Yizumi is by quantity the third-largest manufacturer of injection moulding machines and the second-largest manufacturer of die casting machines in China and the world. Yizumi just founded a development center in Germany on the RWTH Aachen Campus to start up with preliminary development work and, in close cooperation with its Chinese colleagues, to steer the implementation towards products suitable for industrial use. AZL interviewed Richard Yan (CEO) and Hans Wobbe (CSO) from the new AZL Premium Partner Yizumi.

AZL: Asia, especially China, is the world’s largest demand region. What is your perspective on the market from the point of view of a Chinese machine manufacturer?

Richard Yan: The Asian market, especially our home market China, is growing at an enormous rate. We participate strongly in this, as Yizumi was founded only 15 years ago and now builds about 1,000 machines per month. By contrast, the European market, which is dominated by Central Europe, is rather stable, but is characterized by advanced technologies and innovative trends. So far, we have been less present, but we have formulated this as a goal in our strategy.

Which technological trends do you regard as most important?

Hans Wobbe: I can clearly see the lightweight construction with multi-material systems in the top focus. With our injection moulding, die casting and thixomolding activities. This means that any combination is possible.

Hans Wobbe: In particular, we are thinking here of lightweight construction technologies based on organic sheet thermoforming or UD tapes. But die casting of structural components made of magnesium also has future potential.

What role do combination technologies play?

Due to our product range, the metal- and plastic combinations will play an important role. We see a lot of development potential here in a swivel-platen machine that combines the Mg-Thixomolding with the plastic. The combination technology of injection moulding with polyurethane is also on our agenda, together with a European partner.

What technologies does Yizumi rely on in the field of lightweight design with plastics?

Richard Yan: We introduced the basic foaming of plastics some time ago, based on MacCell technology. In addition, we are uniquely positioned with our injection moulding, die casting and thixomolding activities. This means that any combination is possible.

Hans Wobbe: We are the only company in our industry to be located directly on a university campus with a development center. There is no better environment for innovation! We will merge this advantage with the speed of innovation and the cost advantage of the Chinese parent company in the later mass production.

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How do you see the competitive advantage?

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How do you want to get involved in the AZL company network, and which partnerships do you want to build?

Richard Yan: Our goal is to actively participate in the AZL company network in all projects that overlap with our strategy.

Hans Wobbe: In particular, we intend to initiate new projects in the future from our side. We see the resulting partnerships ideally always consisting of material manufacturers, institutes, end users and mechanical and plant engineering. Our experience has shown, that the best results are achieved in such a combination of proven experts. This is why we are planning to expand our current offices on the RWTH Aachen Campus into a fully equipped development center with our own technical center in the coming years.
CONIBILITY GMBH AND FRAUNHOFER IPT HAVE STARTED LONG-TERM COOPERATION

For further development and commercialization of Fraunhofer’s tape-placement and tape winding systems with in-situ-consolidation by using diode laser, VCSEL or IR heat sources communication with the master control system. Conbility provides the single applicator as well as turn-key ready systems including the robot and handling systems.

Unique selling point of the PrePro 3D system is its multifunctional range of use: it accomplishes laser-assisted thermoplastic tape placement, IR-assisted thermost Sophia Pratt of prepping plan and dry fiber placement: 3 technologies included in one single modular system.

During the JEC exhibition in Paris (March 6th – 8th 2018), Conbility Gmb will present its new VCSEL-Tape Placement and Winding Applicator (Fig. 3), developed in cooperation with Fraunhofer IPT and Philips Photonics. This applicator uses an integrated VCSEL-Laser System as heat source which has been developed by Philips Photonics. This tape-placement and winding applicator can also be integrated as modular "plug-in" system into industrial jointed-arm and linear gantry robots in variable manufacturing cells. Using the new VCSEL-Laser as heat source

Fig. 3: VCSEL-Tape-Placement and -Winding Applicator © Fraunhofer IPT

During the JEC World 2018: Showcase of VCSEL-Tape-Placement and -Winding Applicator Thomas Weiler | Conbility GmbH | Technology Consultant | thomas.weiler@conbility.com

NEW LASER SYSTEM FOR COMPOSITE MANUFACTURING From Philips Photonics

Philips Photonics presents a new high power laser module at the JEC World 2018 which shows in Paris, optimized for the specific process conditions and module size requirements of fiber/tape placement or winding applications. The new laser module delivers more than 2 kW of infrared power with a power density of more than 140 W/mm². This enables fast layup speed for various types of fibers and tapes, including also high temperature thermosetting materials. With only 49mm width, the new laser module is extremely compact and fits well into typical tape placement geometries. It is typically equipped with an integrated concentration optics for 25µm wide tapes, thereby enabling layup of narrow 3D forms. The new laser module can be used in tape placement heads for single tapes. Moreover, because of its compact size, stacking of many of the new laser modules is possible, supporting thereby also configurations where many tapes are applied in parallel, enabling very high productivity. Because of the dynamic programming of the spatial heating profile, still the flexibility to produce with narrower layup width is maintained in such a configuration.

The new laser module is based on Philips Photonics’ established range of industrial high power VCSEL laser sources (Vertical Cavity Surface Emitting Laser), three robust and compact laser modules deliver directed large-area beams of infrared power and are easily integrated into industrial heating applications and production processes. An electronic driver system enables precise power control and fast switching. As a unique feature, individual emission zones of the source can be controlled independently. Thereby dynamic programming of the spatial heating pattern is possible, enabling an unprecedented level of process flexibility and control.

Dr. Günther Derra | Philips Photonics GmbH Aachen | Business Development Engineer | guenther.derra@philips.com

NEWSLETTER #11/2018

AZL WORKGROUP: PIPES & VESSELS

The Composites Pipes and Vessels group is one of AZL’s product-oriented workgroups. The goal of the workgroup is to link the demands and requirements of OEMs and part manufacturers with the novel solutions of machine material and technology. The workgroup connects the market “pull” with the technology “push.” During the different meetings, the workgroup will more and more associate with technology decision makers. In future meetings, the workgroup will prepare a Customer Pain Point list, focus on OEMs and Tier 1s, and prepare a new solution list and hidden application list for composite pipes and vessels.

AZL in cooperation with Fraunhofer IPT | Your Contact: Tilo Peters | tilo.peters@ipf.fraunhofer.de

WWW.LIGHTWEIGHT-PRODUCTION.COM
AZL: Which major lightweight trends do you observe in the automotive market?

Dr. Jürgen Wesemann: When the discussion about BEVs (Battery Electric Vehicles) emerged, there were opinions that for electrified vehicles higher costs for light weighting would be justified. Lighter vehicles consume less energy so that the targeted range can be realized with a smaller and therefore less expensive battery. This triggered a strong interest in substantial weight savings also by the use of very costly materials, specifically C-fiber composites. However, battery prices were and are still falling. Furthermore, a part of the kinetic energy is recovered during braking so that the energy used to accelerate a higher mass is not completely lost. Besides other aspects, this leads to the conclusion that light weighting for future vehicles is still important but that it is not obvious whether its role will further increase. Accordingly, there is now more emphasis on weight reduction at reasonable cost.

What is the consequence of the trend you describe for the choice of materials and processes in the automotive industry?

The material class with the probably biggest growth rate is hot-formed steels. In modern steel vehicles the body in white consists of up to more than 30% of these grades. Nevertheless the overall use of steel is moderately sinking. On the other hand, the share of Aluminum in body and chassis is constantly increasing. By producing more than 1 Million Aluminum bodies per year Ford is leading the way. The use of plastics and composites is relatively stable but there are some changes. The interest in C-fiber reinforced plastics for bigger structures in mass produced vehicles seems to decline. It is more and more realized that composites with a high content of C-fibres are a fantastic material for low volume products, and customization. However, costs restrict their use for high volume production. Therefore, the focus is rather on plastics and composites reinforced with glass-fibres. Injection molding is a very efficient process for thermoplastic materials but depending on application also materials like organo-sheets and thermo-sets come into play.

What opportunities and challenges do you see for composites in serial production?

The key challenges are costs due to high raw material prices but for thermosets, of course, also the high cycle times. Furthermore, the recycling is more difficult than for metals. Former invest-ments and the limited design-know-how for plastics and composites complicate the move from metal to plastic structures. However, there exist also unique opportunities compared to sheet metal such as consolidation of parts and the integration of functions. Engineers have to further progress to learn how to utilize the design opportunities plastics and composites offer – the one-to-one replacement of a metal part by a plastic or composite is rarely effici-ent. Improved CAE tools will be of great help for this. Upcoming opportuni-ties for glass-fiber reinforced plastics are for example in the chassis for component such as springs, where compos-ites are very attractive for weight saving and good NVH (Noise, Vibration, Harshness) behavior. Especially for expensive fibers such as C-fibers the identification and development of materials demanding a low fiber amount for cost effective use is needed to enable the penetration of the high volume market.
AXIA DEVELOPED COMPOSITE SIP AND STEEL HYBRID HOUSE SYSTEM

Composite SIP (Structural Insulated Panel) with CFS (Cold Form Steel) hybrid building system is developed. The Composite-SIP fastening system for highly structural connection is invented by Axia.

Axia Materials Co., LTD. (please visit www.litetex.com or www.axia-materials.com), an Organisa tion as well as a Composite SIP (Structural Insulated Panel) for building solutions manufacturer, announced new development of LitePan Composite SIP with CFS (Cold Form Steel) hybrid structure house systems. CFS house is a wellknown building structural system for excellent seismic resist with pre-fabricated housing capability. But the many processes of insulation and water proof finishing job of CFS lead to higher cost than conventional building materials. This Composite-CFS Hybrid house system was developed together with Korean CFS company, Steelite Co., LTD., to bring the maximum value of energy insulation, fast construction, cost saving, sustainability, and earthquake and hurricane proof structure. And this LitePan SIP CFS house system eliminated the usage of OSB or Plywood and thus solved the worry on long term durability on these organic wood materials. But this Composite to CFS hybrid building system needed many new developments especially on the connection details between Composite and CFS and also on the solution for different CTE (Coefficient of thermal expansion).

Axia invented Composite-Steel connecting fastening system to have 1,400Nm (1,302 ft.lbf) for pull out strength for each fastener connection details between Composite SIP and CFS. All the CFS were prepared in factory with punched holes and CFS walls were pre-assembled with various forms including C and H shapes. And LitePan SIPs were delivered on site as precut with its average dimension of 2.7m x 9.0m. The process of connections was done on-site by hand tools only and all LitePan SIPs were enveloped and completely sealed the whole area of this Villa using Axia’s LiteTex composite profile with structural glue system to have a monocoque system. The total construction of Composite with Hybrid building structure took 6 weeks while conventional system takes more than 6 weeks in this island. By this dramatic save of time and labor the total cost of this villa construction was decreased by 20% more than original plan.

This Villa is approved to have 1-hour fire proof, hurricane resist and earthquake resist structure. By additional structural property of LitePan SIP, this villa is using only 50% of CFS comparing to conventional 100% CFS structural design.

Fig.: Justin Jin (Axia) and Mikko Lassila (Exel) joining forces

Besides the mutual representation in the Korean and European market, Axia and Exel are jointly developing new solutions including kinetic architectural systems, easy and durable connections, and "smart home" solutions.

The need of replacing complex, heavy and expensive parts in high demanding applications becomes more and more evident. At this moment, EconCore’s R&D team is advancing on developments with high performance thermoplastic materials using the continuous ThermHex honeycomb process. Several new engineered thermoplastic materials like modified PC’s, PA66, PPS were successfully tested and are being developed at the newly refurbished EconCore’s R&D facilities. EconCore is entering into the final phase of validating these materials and targets this year new application developments in markets of automotive, aerospace, transportation and building & construction.

Pre-development work with these high performance thermoplastic materials resulted in very interesting application cases already earlier this year: lightweight photovoltaic panels (www.econcore.com/en/news) and aircraft storage modules (www.econcore.com/en/news/). Thermoplastic Sandwich preforms, called Organosandwich, made of glass fiber reinforced thermoplastics skins (referred often as to “organoskin” or, from German, “organobultch”) offer a unique set of properties and are the latest development from EconCore. Integration of the honeycomb core production with in-line lamination of composite skins allows producers to minimize handling operations and to reduce production costs of with thermoplastic sandwich materials. Furthermore, finishing (e.g. lamination of decorative layers) and post-processing (e.g. thermoforming and overmoulding) operations can be integrated in the process of production of the final sandwich part.

In close cooperation with machine building partners, EconCore started its customized R&D cast extrusion systems in their headquarters in Leuven, Belgium. With this new equipment, EconCore can accelerate and expand their R&D projects. More important, the possibilities of support of EconCore’s licensees on their developments will improve even further. The extruder covers an operating width up to 450mm, a throughput of 150kg/h and has a deep integrated which perfectly fits the needs of the R&D team. It was designed to work with most thermoplastics (PP/PE/PC/PET/Pa6/Pa66/PPS...) within the ThermHex process.

There is an increasing number customers who produce glass fiber composite parts with closed moulding processes. ThermHex Waben GmbH, the daughter company of EconCore, provides now with the “THP890-V” core an improved PP honeycomb for closed moulding processes, like the vacuum resin injection moulding process (VRIM).

MARKET & TECHNOLOGY STUDY COMPLETED: COMPOSITES IN BUILDINGS AND INFRASTRUCTURE

In a 10-month joint study on new potentials for composite technologies in buildings & infrastructure, the AZL together with more than 25 involved companies analyzed markets and technologies in a structured approach to broaden the knowledge on business opportunities for composite technologies. The study resulted in 20 key segments as well as 438 applications with high market potential. 25 of these were analyzed in technological detail, another 11 were used as business cases. In January 2018 this initial collaboration was transferred into an AZL industrial workgroup which will meet every six months to turn insights from the study into a long-term collaboration.
GREAT EASE WHEN BUILDING WITH CONCRETE
KRAUSSMAFFEI EXPANDS THE TECHCENTER TO INCLUDE THE REBAR PULTRUSION SYSTEM

Fiberglass rebar holds great appeal thanks to its corrosion resistance, low weight and high tensile strength. KraussMaffei’s TechCenter offers a unique research program to develop new processes and applications in pultrusion. Significantly faster production speeds than the conventional tub or pull-through processes.

By commissioning the second pultrusion system in the TechCenter of the Reaction Process Machinery division in Munich, KraussMaffei is expanding its expertise in the field of pultrusion. The process is continuously manufacturing fiber-reinforced plastic components. The newly developed rebar system is ideally suited for manufacturing fiberglass-reinforced rebar for concrete elements in the construction industry. Together with the first pultrusion system of the TechCenter – an iPul system for flat sections – KraussMaffei now offers its customers a unique research environment to develop and test new processes and applications in pultrusion.

Growth market in pultrusion
"Pultrusion is a simple way to produce cost-effective profiles, there are hardly any tureksey offers and it is a growth technology. In addition, we are knowledgeable about fibers, metering technology and associated process technology," as Sebastian Schmidhuber, Head of Development for Reaction Process Machinery at KraussMaffei, states, explaining the motivation of KraussMaffei to enter the pultrusion market a year ago. The result of the most recent development work is the iPul system that was launched in 2017, which opened up new applications in pultrusion with significantly higher production speeds than the usual conventional tub or pull-through processes. Therefore KraussMaffei is now expanding its TechCenter to include a second pultrusion system, a rebar system to manufacture pultruded rebar.

Major potential in construction industry
Pultruded rebar based on epoxy and reinforced with glass or (conceivably) carbon fiber offers an enormous potential in the construction industry. "They are corrosion-resistant compared to classical steel reinforcements. Therefore, the overlaying concrete layers can be considerably thinner," Schmidhuber explains. Further advantages include the low weight and consequently cheaper transport. The easier handling at the construction site and the fact that the fiber-reinforced rebar can be produced endlessly and wound onto drums at the end of the pultrusion system. Typical application areas are in infrastructure, for example, in bridges or in road construction or in environments susceptible to corrosion in functional buildings.

To date, finding a means of efficient production has been part of this implementation suitable for series production. "The classic production speeds for rebar in the conventional tub or pull-through processes are still at relatively low haul-off speeds, in some cases under 0.5 m/min. With the new iPul system, we are aiming at up to six times faster speeds in our TechCenter and therefore offer a cost-effective alternative to conventional steel reinforcements," Schmidhuber said. KraussMaffei works closely with Evonik, which has specifically developed an ideally suited epoxy resin for this application. Additional partners are Thomas Technology (radio-pultrusion) and Alpex (mold technology).
IHENKEL TO SHOWCASE ITS COMPREHENSIVE COMPOSITE EXPERTISE AT JEC WORLD 2018

As a global solution provider to OEMs and Tier 1 suppliers, Henkel continues to drive significant progress in sustainable lightweighting technologies with new composite and adhesive products and expanded global Composite lab capabilities. Further with a 10-year production backlog and new aircraft and locomotive orders, the demand for lightweight composites, both Henkel’s expertise in process automation and its high-impact solutions for the aerospace industry are in high demand.

Among the highlights for the automotive industry on display will be Henkel’s new Locitite MAX 5 matrix resin for carbon fiber reinforced composite wheels. The new technology is designed to replace aluminum in this demanding class application and builds on the recent success of Locitite MAX 2 for use in glass fiber reinforced leaf springs. The new resin combines high temperature resistance, excellent toughness and long-term durability with rapid mold filling, thorough fiber impregnation and high curing rates for cost-efficient large volume production.

To serve up to 40,000 new aircrafts over the next two decades, this growing demand for high-impact solutions, Henkel has started the construction of a new production facility for aerospace materials at its site in Montornés del Vallés, Spain. The facility will include new buildings and equipment for additional production and warehouse capacities to further support key trends in the industry such as light weighting and automation. Due to the proximity to several sites of global key customer Airbus, Montornés will become Henkel’s European hub for the aerospace industry.

At JEC World 2018 on Booth G48 in Hall 6, Henkel’s specialists will be available to discuss the benefits of the company’s broad product portfolio and global service capacities for composite applications in automotive and aerospace.

Advanced potting compounds offering improved micro-cracking resistance, optimized density/weight ratios and flame retardancy for honeycomb sandwich structures will be in the spotlight of Henkel’s exhibit for aerospace solutions at JEC World 2018.

IBOSS – AN INTELLIGENT PLUG & PLAY APPROACH TO SPACECRAFT ENGINEERING AND SERVICING

In 2018, the project “intelligent Building Blocks for On-Orbit Satellite Servicing and Assembly” (iBOSS) accompanied by its “new space” company iBOSS Gmbh, heads for ground qualification of its core technology, working towards the 2020 goal of in-orbit demonstration.

With upcoming private and commercial aerospace companies entering the playing field of “New Space”, the sustainability of space technologies has been brought into the focus of innovation. Common satellites are highly integrated and monolithically in their design. Maintaining them in space is not feasible and in case of failure of a single component, the mission is impaired, if not compromised. Higher sustainability and cost efficiency of satellites hence goes hand in hand with the capability to provide on-orbit service.

The iBOSS project substitutes today’s satellite design with a modular system that is maintainable and upgradeable in space. This new satellite architecture uses standardized building blocks called iBLOCKs. They are connected to each other via interfaces building up the satellite in a modular way.

The project granted by the German Aerospace Center (DLR) is funded by the German Federal Ministry for Economic Affairs and Energy. Originally started in 2010 by the University of Berlin (TUB), the Research Center for Informatics in Karlsruhe, the RWTH Aachen University’s Institute of Structural Mechanics and Lightweight Design (SLA) and the Institute for Man-Machine Interaction (MMI) for the project aims for in-orbit demonstration in 2020. The iBOSS GmbH has been founded in 2017 by Prof. Dr.-Ing. Kai-Uwe Schröder, Dipl.-Ing. Jörg Kreisel and Dipl.-Ing. Thomas A. Schervan. The start-up’s primary function as IP holder is the development of the business area and partner network. The company is offering iBOSS key technologies: First the intelligent Space System Interface (iSSI), a 4-in-1 orbit interface providing a rigid mechanical connection and transfer of electric power, data and thermal heat. It is complemented by the iBOSS Solutions GmbH accumulating the know-how with focus on R&I, founded by Prof. Dr.-Ing. Kai-Uwe Schröder and Prof. Dr.-Ing. Jörg Kreisel. For the years ahead, partnerships with industry and academia will be vital to keep iBOSS on fast-track.

Module satellites have the potential of being a disruptive technology taking aerospace to the next level towards “New Space”, making aerospace technology more flexible, sustainable and cost-efficient.

AZL CONNECTING WITH COMPANIES FROM ZHEJIANG PROVINCE IN CHINA

In November 2017, AZL visited the Zhejiang province in China together with a group of German experts for Industry 4.0 and production technology, organized by the German Federal Association for Economic Development and Foreign Trade (BWA). During the Shaoxing and the Taizhou Expert Conference, the AZL team presented the Aachen lightweight technologies: First the intelligent 1-in-1 interface building block iBLOCK (© SLA of RWTH University and R&D) and the Institute of Structural Mechanics and Lightweight Design (SLA) and the Institute for Man-Machine Interaction (MMI) with industry and academia will be in hand with the capability to provide on-orbit service.

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AZL GOES US AND CHINA: UPCOMING AZL B2B NETWORKING EVENTS ADDRESSING REGIONS

Each year, the AZL Partners focus one target region and target market for their B2B Networking activities. After visiting Poland in 2017, USA was voted by the Partners to be the focus region in 2018 and China the region to be addressed in 2019. In October 2018, AZL Business and Premium Partners will network with American and composite companies during a Networking Event taking place during CAMX show in Dallas, Texas and joint visits of the show. The AZL team will collect details and analyze trends, markets and innovations on site and will provide this information to all AZL Business and Premium Partners. Activities in China will be communicated soon.

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Toolmaking made easy. Aliancys is now introducing the Neomould® 2017-S resin, setting new standards in composites tool manufacturing and bringing multiple benefits to the professional toolmaker. The zero-shrinkage feature of Neomould® 2017-S resin enables to make parts and perfectly mimic plug surface and dimensions.

Great Support. Aliancys has developed a new Neomould® tooling brochure for guiding customers through the toolmaking process. Additional training and technical support are available for customers through Aliancys technical experts.

Aliancys is introducing the new Neomould 2017-S-1 resin for manufacturing composite tooling. The unique resin characteristics enable to make molds that perfectly mirror the surface and dimensions of the plug. The thixotropic nature of the resin allows for excellent application on vertical surfaces without sagging. For that reason the resin is highly suitable for making thick parts in one go.

For cost-efficient manufacturing of composite components in small to medium sized production series (up to 500-1000 parts per year), composite molds are broadly used across the industry. While they bring the designer the ability to create unique shapes, composite tools also enable the manufacturing of large components like wind turbine blades, boats, and façade panels for buildings.

Compared to tools manufactured in steel, the production of composite tools is fast and versatile. For these reasons composite molds have built a track record of performance already over many years.

LAMILUX X-TREME PRODUCTS: MAXIMUM WEIGHT, MAXIMUM STRENGTH

In the fast lane with lightweight design

Side walls, roofs and floors in commercial vehicles, canoes, houses and similar need to be extremely lightweight and low weight with everything matched to the application in question. The reinforcing glass or carbon fibers in the material are positioned in a uniaxial, biaxial, triaxial or multi-directional arrangement, depending on needs. This alignment process determines how strong the material is, making it perfect for any set of requirements. This enormous increase in strength can also ensure significant savings on material thickness. Less is truly more with LAMILUX X-treme – more lightweight to be precise. This characteristic is crucial for performance in vehicle construction and sports equipment. Everyone wants to save energy, yet no-one wants to curb their speed.

High-strength and thermally resistant LAMILUX X-treme and LAMILUX X-treme Carbon absorb any load and tension forces acting on sandwich panels when used on extensive surfaces in side walls, roofs and flooring, making the whole structure resistant to torsion. This becomes clear when the carbon-fibre-reinforced polymer is compared to other materials used as sandwich face sheets: it is up to 50 per cent lighter with a tensile strength three or four times greater than steel or aluminium.

The low thermal expansion in this composite material ensures large structural components can be produced without bubbles or distortions emerging in the long term. The low thermal conductivity in products and the consequent optimised insulation in refrigerated bodies make powerful arguments for the materials’ use in refrigerated trucks.

High impact resistance. However, all such properties are not of any use to the commercial vehicle industry if the material is unable to take mechanical stress loads caused by shock and impact. X-treme products not only withstand such loads, but usually resist them in a way that completely prevents major damage and downturns due to repairs in most cases. The material even manages to endure hail storms and extreme weather conditions, making it ideal for both body interiors and exteriors.

LAMILUX fibre-reinforced composites are produced in a continuous, automated production process. Five separate production lines guarantee minimum delivery periods while providing consistently optimum quality which can be reproduced at any time. Then X-treme product range can be manufactured in widths up to three metres while the length of sheets or rolls are tailored to customer requirements.

BYK’S FIRST COUPLING AGENT FOR CARBON FIBER REINFORCED COMPOSITES PAVES THE WAY FOR FUTURE TECHNOLOGIES

BYK-C 8013 is the world’s first coupling agent for carbon fibers. The additive is used in carbon fiber reinforced vinyl ester and unsaturated polyester resins. Transverse and flexural strength are significantly increased and thus the freedom of design is enhanced.

Thermoset Carbon fiber reinforced plastics (CFRP) are used where the need for high material strength meets the demand for lightweight properties of the composite parts. Examples for these applications comprise aerospace and automotive industry, mobility, and wind energy applications.

Besides epoxy based thermosets, vinyl ester and unsaturated polyester based composites play a significant role in this field. Even though carbon fibers improve the mechanical properties of the plastic material, a further improvement of strength is always desirable. As can be seen from an EM picture of a failure in a CFRP laminate (Fig. 1), the carbon fibers do not expose any resin leftovers at their surface, i.e., the adhesion between the resin matrix and the fiber leaves room for improvement.

How Coupling Agents help to Overcome Limitations Coupling agents provide a bridge builder function between particulate filler or fiber materials and an organic resin matrix by establishing strong bonds to the surface of the fiber/fiber and cross-linking into the matrix during the thermoset curing process. This additional bridges between the two components of the formulation provides increased mechanical robustness of the final composite material.

BYK-C 8013 is Designed to Improve Vinyl Ester and Unstaturated Polyester based Carbon Fiber Composites. The structure of BYK-C 8013 provides two taylored functional groups: (i) A reactive double bond that can easily participate in a radical cross-linking process, and (ii) a surface active group with optimized affinity towards carbon fiber surfaces. The effect can also be made visible in the electron microscopic picture (Fig. 2).

To increase resource-efficiency in the production of continuous fiber-reinforced plastics, the manufacturing of scrap-optimized blanks with defined fiber alignment (“tailored composite blanks”) on basis of unidirectional semi-finished products (thermoplastic tapes, tow-pregs or dry-fibers) offers high potential compared to textile-based pre-products. Nonetheless, today’s production systems for the manufacturing of tailored composite blanks are limited in throughput per system and their scalability. The project aims to realize a novel machine solution for the high-volume production of tailored composite blanks with output rates in the range of 500 kg/h. After finalizing the project by May 2018, the follow-up project will be presented at the Annual Partner Meeting in June 2018.

Your Contact: Thomas Weiler | thomas.weiler@azl.rwth-aachen.de

Next Date: May 15th, 2018
ASHLAND PRESENTS ITS RESIN PORTFOLIO FOR THE TRANSPORTATION MARKETS

At Ashland, we’re always solving the toughest material challenges. That means making composites that help you make world-class products: stronger, lighter, tougher, more fire resistant and more attractive.

As the world's leading provider of resin systems and additives for SMC and BMC, we bring exceptional product capabilities in Europe. Next to the industry insights to customers in a host of markets, Ashland continues to expand its SMC capabilities in Europe. Next to the 1,000 kN press and analytical equipment installed in the European R&D lab back in June and the acquisition of Etain plant, Ashland is now focusing on strengthening its business development and technical teams to support customer & market needs.

Ashland offers an extensive resin portfolio for the Transportation market based on unsaturated polyester resins, vinyl ester resins, and low-profile additives with brands such as Arotran™, Derakane™ and Neulon™.

See the graph to see some of our specific applications.

Fig.: The transparent NFRP door panel illustrates the position of ‘NFR-HTC Door Pocket’

AZL WORKGROUP: HIGH-PERFORMANCE SMC

The drive to further weight savings and significant reduction in CO₂ emissions requires a next generation of High-Performance SMC (Sheet Molding Compound) with short and continuous fiber reinforced systems using both carbon and glass fibers with customized resin compounds. The AZL partners confirmed the need for a material data base for high-performance SMC, which will be the project for upcoming meetings. Additionally, AZL initiated a Joint Market and Technology Study that provides in-depth knowledge on applications and technologies, key challenges and technological solutions. The study consortium is still open to join.

More information at lightweight-production.com

YOUR CONTACT: Dr. Michael Effing | Senior Advisor | +49 241 80 23 887 | michael.effing@azl-aachen-gmbh.de

AZL @ JEC WORLD

As part of the renewed partnership between the Aachen Centre for Integrative Lightweight Production (AZL) and JEC Group, the AZL, its 9 Partner Institutes as well as the sponsors Hille and MaraHachi and the industrial Partners Comibilty and Code-PS will be present at the JEC World in Paris for the 4th time, on the exhibition ground “Composites in action” to exhibit their innovative products.

Meet the AZL team: Hall 5A, Booth C65 and join the conference “Buildings and Infrastructure: the high-potential market for composites”

FARPLAS LIGHTWEIGHT APPROACH APPLICATION OF NATURAL FIBER REINFORCED PLASTICS TO HYBRID COMPOSITES - FIAT DOOR PANEL

Farplas is the leading interior and exterior trim supplier for all automotive OEMs in Turkey. It is dedicated to improvement based on innovation and technology. The company has won Turkish Innovate Leagues ‘2017 Innovation Strategy Award’ in ‘Exporting, Exports Association’ Lightweight has been one of the major innovation strategies. Although known as an injection molding company, ’integrated state of the art’ technologies and usage of novel materials are adapted to “light-weight focused” production capabilities. Fiber from line for hybrid thermoplastic composites, Micromellar phosphonic and chemical foaming of plastics, Infrared cured joining of complex trims and in mold decoration are some of them.

In 2017 Farplas R&D has finalized 2 Hybrid Thermoplastic Composite (HTC) projects with Fiat-Tofas Turkey as the OEM partner, Both projects were funded by The Scientific and Research Council of Turkey. One of the HTC projects comprised metal replacement using Luranex laminates and thermoplastics. The other HTC approach implied a thermoformed NFRP (natural fiber reinforced thermoplastics) Door panel and adaptation of the ‘NFR-HTC Door Pocket’. Karel Tool Maker was our partner in this work. The NFR-HTC Door Pocket benefits from the sustainable and eco-friendly route due to 50% Natural Fiber in composite sheet. Back injection step in Fiber Form process is a very important part of the composite process: satisfying stiffness and barrier against adverse environment, it protects the edges of the composites from mechanical abrasion and shares load with NFRP composites.

To understand the adhesion development through overmolding, a non-isothermal screening procedure for bonding modern polypropylene (PP) to an FRP heated thermoformal NFRP sheets has been developed. The method has been implemented to optimize boundary process temperatures for good bond formation as a function of NFRP sheet composition while optimizing IR heating system and injection cycle.

Our approach is a good example of highlighting different spes of HTC products such sustainability and NVH.

Regardless of the powertrain, lightweight is one of the most important design targets from our OEM customers

Dr. Bing Liu | Ftech R&D North America Inc.
President | bliu@ftech-rd.com

The Ftech Group is a global automotive Tier 1 providing chassis, support structures, and pedal assemblies for mass production. Since 2016, the R&D division of Ftech is part of the AZL Partner Network exploring opportunities for future composite applications.

AZL: Why do you invest in composite technologies?

Dr. Bing Liu Light-weight has been, and continues to be one of the most important design targets from our OEM customers, regardless of the choice of the powertrain – combustion engine, electric motor, or hybrid. To meet their demands as the tier-1 chassis supplier, Ftech has built up the technologies for designing and manufacturing highly-optimized metal components. However, the composite material technology is quickly advancing and we see a good potential. Therefore we want to follow the technology, evaluate the application potential in our products, and build up our own expertise in order to enable ourselves to use the technology. That’s why we invest in composites research, and we really like the open collaboration approach which is found here in Europe.

What are the bigger trends in the automotive chassis market?

The transition to the use of global platforms by OEMs has significantly changed how we work with them. This means we must support their local R&D teams as well as to deliver products globally. Another challenge is that the part requirements must be set considering many more markets and vehicle variants than in the past.

Additionally, some customers are looking for new technologies like composites because they are fundamentally different in so many ways from the traditional metal parts.

WWW.LIGHTWEIGHT-PRODUCTION.COM
AZL EXECUTIVE B2B NETWORKING EVENT @ IAA | SEPTEMBER 2017

During IAA, the leading automotive trade show, more than 50 high-level participants met in Bad Honnef for the AZL Executive Networking Event. The idea of the event was to bring together automotive and lightweight senior executives with key representatives in the automotive and composite sector to discuss the future trends in lightweight.

Four keynote speakers introduced the event with their view on lightweight technologies in the automotive sector.

Dr. Stefan Künzlek, Director, Lightweight, Materials, Manufacturing, Group Research & Sustainability at Daimler AG; Dr. Jürgen Wesemann, Manager Vehicle Technologies & Materials at Ford Research & Advanced Engineering Europe; Dr. Bin Wei, Manager Lightweight at NIO; Dr. Harjune Kim, Project Leader Composites at LG Hausy R&D Center.

In a panel discussion, the speakers discussed the importance of lightweight in view of e-Mobility and autonomous driving.

In the subsequent networking dinner, the participating 13 presidents and vice presidents, 28 executives and 12 senior managers representing composite and automotive companies, connected and discussed in an easy and uncomplicated atmosphere.

On the following day, a guided tour over the IAA Trade Show gave insights into new automotive trends provided by exhibitors of the New Mobility World: Tata Steel, IBM and Google. The Tier 1’s Fairedic, Plastic Omnium and Magna gave insights into their lightweight strategies.

The next Executive Networking Event is planned for IAA Cars in 2019.

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POLY-DCPD, A NEW RESIN FOR HIGH PERFORMANCE COMPOSITE RADOMES

A composite with superior dielectric properties and very high RF transparency

Telene SAS (France) developed a new DCPD based resin system formulation for radomes. Radomes are the covers for antennas and radar system, which protect these often fragile systems against external influences such as wind, rain and hail. Radomes are in many cases produced as fiber reinforced plastic structures, sized from small spherical or flat shapes of less than 1 meter, to very large 3D structures with a diameter of 10 meters and more.

Telene SAS and Thales (Netherlands) worked together to develop a composite system, based on the poly-DCPD resin technology of Telene. Thales is using composite materials for the radomes of radar and antenna systems that they develop and produce, mainly for the defense industry, where a maximum transparency for Radio Frequency (RF) is required.

Today, mainly formulated epoxy systems and glass fiber are used for standard radomes, but for high end radomes more exotic (and expensive) materials like quartz fiber and cyanate esters are applied.

The cooperation between Telene and Thales showed that the use of the very low viscous DCPD based resin system formulation in vacuum infusion results in a radome material that outperforms the current best-in-class materials for radomes, such as quartz and cyanate esters, the latter resin systems requiring more expensive manufacturing technologies such as prepregs and autoclaves.

In the table below, the dielectric properties of poly-DCPD composite materials are compared to the state of the art materials for radomes:

<table>
<thead>
<tr>
<th>Resin Type</th>
<th>Reinforcement Type</th>
<th>εr @1GHz</th>
<th>tan δε@1GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>epoxy</td>
<td>glass fiber fabric</td>
<td>&gt;4,5</td>
<td>&gt;0,011</td>
</tr>
<tr>
<td>poly-DCPD</td>
<td>glass fiber fabric</td>
<td>3,39</td>
<td>0,007</td>
</tr>
<tr>
<td>epoxy</td>
<td>quartz fiber fabric</td>
<td>3,4 - 3,8</td>
<td>0,009 - 0,011</td>
</tr>
<tr>
<td>cyanate ester</td>
<td>quartz fiber fabric</td>
<td>3,2 - 3,35</td>
<td>0,001 - 0,009</td>
</tr>
<tr>
<td>poly-DCPD</td>
<td>quartz fiber fabric</td>
<td>2,76</td>
<td>0,08</td>
</tr>
</tbody>
</table>

Apart from the excellent RF-transparency, poly-DCPD based composites have high impact resistance, fracture toughness, hot wet resistance and high HDT; all properties that are required for high performance radomes.

Telene and Thales are working now on the development of new radome systems for the next generation of radar systems of Thales.

Ben Drogt | Telene SAS | info@telene.com

Fig. 1: P6 Car Frame Source Huntsman

Huntsman’s portfolio of RIMLINE® and VITROX® resins are combining high productivity with excellent durability.

Global business competition in automotive has reached new heights and the demand on manufacturers to sustain their competitive edge while securing long-term growth has never been greater. The Polyurethanes division of Huntsman drives the innovation in Polyurethane composite resins, addressing current and future automotive demands for lighter, safer and more durable car parts and components.

Huntsman’s RIMLINE® resin system is the best choice for customers seeking to combine high durability with high productivity. The resin’s high-toughness supports versatile parts design with thinner profiles and provides strong impact resistance without the need of mat reinforcement. Fast curing time of <90 seconds makes it a resin system of choice in high volume applications like package trays, under carpets, sun shades, interior trims, hood inner panels, pillars, etc. The portfolio of RIMLINE® resins can be tuned to fit specific needs of RTM, Pultrusion, LFI, Sprayed Foam, Filament winding and CIPP for manufactured vehicle components like pillars, leaf springs, spoilers, seat frames, rear and front bulkheads and body sides.

To provide customers with unique chemical and processing compatibility in composite sandwich structures, Huntsman introduced VITROX® foam core – an MDI-based foam delivering additional mechanical strength, lightweight and complex design options to composite sandwich and more.

Partner with Huntsman Polyurethanes global network of experts to explore new composite horizons and benefit from innovative chemistry, state of the art prototyping and physical testing capabilities.
Up to now, lightweight construction with fiber-reinforced plastics (FRP) has mainly been achieved by taking the geometry of a metal component and substituting the material with quasi-isotropic FRP laminates. Such structures, often referred to as “black metal”, do not fully exploit the excellent specific mechanical properties of the composite material. This leads to unnecessarily high material usage and thus increased component costs.

In order to address this problem, effective design concepts must be developed that focus on the load-optimized application of the material. At ITA such a concept based on innovative reinforcement fabrics, so-called Tailored Textiles, is investigated. These fabrics feature integrated local reinforcements that allow the component properties to be specifically adapted according to the load paths. The reinforcements can be integrated during the fabric production, which saves cost-intensive follow-up processes such as cutting and stacking.

The general approach is to integrate the novel design concept into the conventional product development process for composite parts. The first step is to create a preliminary laminate design. The load paths are identified by topology optimization according to a defined load case. Subsequently, the positions for necessary reinforcement structures are derived. Based on these information and a given production scenario (e.g. planned quantity), a tool developed in-house identifies suitable Tailored Textile technologies. For this purpose, possible component concepts resulting from the combination of different reinforcement structures are generated according to the boundary conditions of the technologies. The local reinforcements of the most suitable combinations are subsequently worked out in detail. Finally, the identified concepts are evaluated regarding their lightweight and economic potentials by comparison to a quasi-isotropic concept. The investigations at ITA have shown that the use of Tailored Textiles allows a weight reduction of approx. 30%. In combination with the reduction of necessary follow-up process steps, the component costs can be decreased by up to 25%.

Fig.: Process for the load-optimized design of FRP-components using Tailored Textiles.

**RESISTANCE PROJECTION WELDING OF CONTINUOUS FIBER REINFORCED PLASTICS**

Researchers at RWTH Aachen University develop welding process for direct welding of endless fiber-reinforced plastics (FRP) for lightweight construction.

Structures made of FRP are often connected to the overall system by mechanical connection points or have functional surfaces made of metal. Joining technology is therefore a key technology and the subject of numerous investigations. At present, a connection between metals and plastics can only be made reliably by means of mechanical joining processes or adhesives. Mechanical joining processes usually cause fiber damage in the FRP. The direction-dependent material properties are strongly negatively influenced by this. On the other hand, structural bonding offers only limited ductility and therefore fails brittle without being able to detect imminent failure at an early stage. In addition, the adhesive only joins the joining partners to each other superficially, which is why the application of force to deeper lying fiber layers is insufficiently carried out via the matrix. Although different approaches to the production of plastic-metal composite parts are being investigated, there is still a need for a joining process that adequately meets the technical and economic challenges of joining metal and fibre-reinforced plastics.

A joining process has been developed which enables direct welding of fibre-reinforced plastics to metals by resistance projection welding. In this way, continuous fibre-reinforced plastics can be processed without damaging the fibres. In particular, the fabricators can continue to use existing resistance welding systems in the usual way, with minor modifications if necessary. A core concept is integrated locally into the (fibre-reinforced) plastic as part of the FRP manufacturing process: Small metallic pins structured as pins are applied to a carrier metal plate and penetrate the plastic and the surrounding plastic. The insert allows a current flow through the electrically non-conductive resin and thus ensures indirect weldability of foreign materials.

Different designs for the metallic inserts have been investigated and tested. The invention will be further developed in the framework of an AIF project with the support of industrial partners.

Jens Lette | Welding and Joining Institute (ISF) at RWTH Aachen University | Research engineer / Resistance Welding | jlette@ifw.rwth-aachen.de

**FUNCTIONALIZATION OF CFRP LIGHTWEIGHT CAR BODY STRUCTURES BY INTEGRATION OF LASER AND INJECTION MOLDING TECHNOLOGY**

With the inter-disciplinary BMBF cooperation project “OPTO-Light”, the adhesive-free bonding of thermosetting and thermoplastic FRP was implemented for the first time in large-series production with cycle times of less than 3 minutes. The developed process chain of prepreg compression molding, laser pre- and injection moulding enables the load and waste of continuous fibre-reinforced hybrid plastic components to be produced in an integrated production cell with a cost reduction potential of more than 20%. The demonstrator made of carbon fibre-reinforced epoxy shell element and glass fibre-reinforced PA6 ribbed structure was derived from the current BMW i3. The 200-tions injection molding machine with turning plate CXW 200/380 provides the basis of an innovative three-stage process chain, which produces fiber-reinforced thermoset-thermoplastic hybrids for high-volume structural applications.

AZL and its project partners were awarded with the prestigious Innovation Award of the industry association AVK in the category “Research and Science” for “Photonics-enabled process chain for manufacturing functionally integrated thermosetting/thermoplastic hybrid components for automobile construction”.

Fig.: OPTO-Light demonstrator as part of a serial geometry of the BMW i3.

In interdisciplinary cooperation with BMW AG, KraussMaffei Technologies GmbH, ARGES GmbH, Precitec GmbH & Co. KG, Sensortherm GmbH and Zeiss Optotechnik GmbH, the Aachen Center for Integrative Lightweight Production (AZL) was strongly involved in this development as the process- and system integrator. “AZL has extensive expertise in developing combination technologies in regard to material sciences and production technology. For this research project this is extremely valuable, particularly the know-how in the area of reaction- and laser system technology” emphasized Martin Würtele, who is head of technology development at Krauss-Maffei Technologies GmbH and project coordinator.

On February 6th 2018, the developed technologies of the research project were presented thoroughly during a public final meeting in the technical laboratory of AZL in Aachen.

Richard Schaurus | Aachen Center for Integrative Lightweight Production (AZL) of RTWH Aachen University | Research Assistant | richard.schaures@azl.rwth-aachen.de

Fig. 1: Hybrid joint of FRP an steel via small scale form-fitting elements.

Fig. 2: OPTO-Light final meeting in February 2018.

**AZL WORKGROUP: HYBRID THERMOPLASTIC COMPOSITES**

Thermoplastic composites become increasingly popular in cost-driven industries due to short cycle times, robust production technologies and recycling opportunities. Production processes combining continuous and short or long fibre reinforcements allow a high design flexibility as well as good mechanical properties at the same time. The Workgroup works on the consolidation of the high-potential overmolding technology of thermoplastic FRP inlays for series production with partners of industry and RWTH Aachen University since 2013. The Workgroup so far has initiated 5 Joint Partner Projects.

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DEA288 – THE CURE FOR YOUR PROCESS

A unique sensor for a robust and efficient automated mid- and high-volume production of composite components.

The Fraunhofer Institute for Production Technology IPT will be presenting the use of DEA288 – THE CURE FOR YOUR PROCESS at the JEC in Paris, hall 5A, C55. Visitors to the fair will be able to experience these advantages at first hand: The Fraunhofer IPT booth (HALL 5A, C55) and to access information such as process speeds or data relating to the materials used.

LAYER-FOR-LAYER PRECISION PLUS HIGH PERFORMANCE

The first process for manufacturing of thermoplastic composite components with organic sheets have reached the series production stage. Further developments are now focused on solutions for thermoplastic tapes reinforced with glass and carbon fibers. ENGEL – the injection molding machine maker and systems supplier – also gathered the necessary experience in the production of robot components. The ENGEL e-pic robots are fitted with a lightweight carbon rotational axis.

AZL FOLLOW-UP PROJECT

"NEW DESIGNS FOR DOUBLE-BELT PRESSES"

The project aims at improving the energy efficiency and product geometry flexibility in production of composite sheets with double-belt presses. The first phase of the project, the AZL, together with seven partner companies, developed a prototype for proof of principle of a novel cost and energy-efficient double-belt press system for the continuous production of composite sheets. The follow-up project aims at enhancing the developed double-belt press system with the aim to build an industry-scale machine according to the pursued concepts.
**THE JAPANESE THERMOPLASTIC COMPOSITES MANUFACTURER MARUHACHI GOES EUROPE**

The Japan-based MaruHachi Group is a well-established, family-owned firm with over 80 years of experience and a strong history in automotive and medical textiles. MaruHachi has now been active in the composite business for more than 10 years, before entering the Euro- pean market in 2017. With its products and offerings, MaruHachi aims to particularly serve applications in the field of sports and leisure, consumer goods, electronics and elec tricity, building and infrastruc ture as well as transportation including aviation, the automotive and train sector.

The specialty manufacturer of small-size tailor-made thermoplastic composite components in form of tapes and organo-sheets develops high-quality products using various polymer types, ranging from PP, PU, PE, TPU, PA6 and other specialty PAs, PPS, PEl, PES, LCP to high temperature PEEK and the traditional fiber systems of glass, carbon and aramids. Especially MaruHachi’s products like tapes, sheets, near-net shaped preforms and preplates represent an interesting category of material systems and semi-finished products with higher performance, tailored and optimized for any new applications. MaruHachi’s focus and competences lie here in the offering of various integrated functionalities, extremely thin layers and complex shapes.

Joint developments together with its customers and make to order are MaruHachi’s strength. MaruHachi figures as a one-stop shop for OEMs, Tier 1 and Tier 2s (compression and injection molders) with its offering of flexible style prototyping processes and its continuous and discontinuous manufacturing System and machinery are also developed in-house. With its products, MaruHachi aims to contribute to significant weight reductions of the final product, thus improve energy efficiency while offering a cost-effi cient and high-quality solution. In Europe, MaruHachi cooper ates with Dr. Michael Ebbing who advises and supports the company strategically with its company AMAC GmbH. During 2018, Dr. Toshihiko Sugahara will preside over the Japanese Sampe and in this role, he will be happy to connect with those ones of the AZL partner network who are interested in a closer and direct contact with Japanese firms.

MaruHachi is attending the JEC WORLD 2018 as a Sponsor and will exhibit within the AZL area.

**ARRK WILL BECOME SUBSIDIARY OF MITSUI CHEMICALS**

Mitsui Chemicals and ARRK have announced, that globally active ARRK Cooperation will become a consolidated subsidiary of the Mitsui Chemicals Group.

Materials from the Mitsui Chemicals Group are widely used in such fields as electronics and information technology, automotive, housing and construc tion, packaging industries, healthcare and agriculture. The company’s products include specialty chemicals, functional polymeric materials, polye theran, basic chemicals, petrochemicals and films and sheets. Along with PP compound operations (PRIME POLYPROP™), the Group supplies a wide range of products such as TAFMER™, AILASTOMER™, Mitsui EPT™, ADMER™, ARLEN™ and APEL™, which are ideally suited to any functions concerning the diverse needs of customers. Regarding the composite business, the Mitsui Chemicals Group provides and continuously develops LFT compounds (MOSTRON™) already for many years. As announced in the previous AZL NewsLIGHT #10, recent composite developments are focusing on UD-Tapes based on carbon fiber and polypropylene matrix (CF/PP - UD-Tapes).

ARRK operates as a business group that provides development support for new products in the industrial goods sector. With activities ranging from produc ing design models for initial development to providing support for low-volume manufacturing of products and product molds, the company’s primary business model is to support the product development of its customers. ARRK provides products and services across five corners of the globe: Japan, North America, China, the ASEAN region and Europe. The ARRK Group in Europe includes several subsidiaries like P+Z Engineering GmbH, Shapers, LCO Protomoule, SPG Pre-Series Tooling & Prototyping B.V. and the ARRK Europe Limited.

ARRK provides products and services across five corners of the globe: Japan, North America, China, the ASEAN region and Europe. The ARRK Group in Europe includes several subsidiaries like P+Z Engineering GmbH, Shapers, LCO Protomoule, SPG Pre-Series Tooling & Prototyping B.V. and the ARRK Europe Limited.
In order to produce more precisely and efficiently, production companies are increasingly taking advantage of the opportunity to have production planning controlled directly by sales. Where in the past it was almost possible to speak of a competitive situation between production and sales, today's digital aids make it possible to achieve a much closer interaction between the individual company divisions.

An MES like that of GRP gives our customers the possibility to manage the entire process to control various different departments like Human Resources, Sales, Maintenance, Production, QM and Administration with one digital platform. While many stand-alone solutions are at risk of losing track of things and the different strands of data, GRP, with its experience of almost four decades of MES business, provides a path that only needs to be adapted to the individual needs of the customer. This kind of digitalization and data collection often leads to the first defined stage of a Smart Factory.

GRP has therefore decided to focus its development on the interaction of the individual modules and web technology. This gives our customers more precise results and greater flexibility through intuitive usability and easier physical structure.

The production system of the BMBF funded research project “iComposite 4.0” (Framework Concept “Research for Tomorrow’s Production,” funding ref. no. 02P14A045) is currently being set up at AZL’s facilities in the Production Engineering Cluster. The next opportunity for the public to catch a glimpse of the “iComposite 4.0” production system will be IKV’s 29th International Colloquium Plastic Technology on Feb. 28th till March, 1st and AZL’s Open Day on April, 19th 2018 at the AZL facilities in the Production Engineering Cluster. This research and development project is funded by the German Federal Ministry of Education and Research (BMBF) within the Framework Concept “Research for Tomorrow’s Production” (funding ref. no. 02P14A045) and managed by the Project Management Agency Karlsruhe (PTKA). The author is responsible for the contents of this publication.

**Equipment for Research Projects**

**Schuler Press System at AZL**

At the AZL machinery hall in the Production Engineering Cluster at the RWTH Aachen Campus, AZL’s Composite Press System with a table size of 1.8 m x 2.8 m and a tonnage of 3,800 tons is already used in research projects such as iComposite 4.0. The Schuler press system is available for joint research projects and bilateral industrial research and projects. For details please contact Mr. Sebastian Stender: sebastian.stender@azl.rwth-aachen.de

**ICOMPOSITE 4.0 Production System is Currently Being Set up at AZL Facilities**

The step to migrate the system to web technology has probably been the most important step in the recent past. This opens up unexpected possibilities for the customer to access from everywhere, as long as in-house IT allows it. This means for example, that sales can receive an access to the current production output in real time and provides its customers with more precise delivery information.

The new existing market developments prove year after year that MESS’s path is not over yet and can be meaningfully integrated into the GRP system. We also receive a lot of input from our customers, whose demands and wishes are fulfilled and implemented together with us, helping us to continuously grow and get better. GRP has and will consider this reciprocity as most important.

**Save the Date: AZL Open Day on April 19th**

Join the AZL Open Day to experience Lightweight Production Technologies on the RWTH Aachen Campus – From carbonisation to quality metrology.

On April 19th, we invite you to visit the machinery halls of the 9 Partner Institutes of the AZL. Located in a walking distance on the RWTH Aachen Campus, 750 researchers and 1,100 students work on about 100 lightweight and composite research projects covering the entire value chain. During the guided tours, the AZL Open Day provides you with extensive insights into this broad range of expertise and equipment as well as with networking opportunities with the industrial participants.

**Save the Date: Annual Partner Meeting 2018 on June 27th and 28th**

AZL Partners will define topics and strategy during Annual Partner Meeting 2018. Each year, the AZL Partner Companies meet in Aachen in order to define the activities of the upcoming year and to network with about 350 participating representatives of the AZL Partner Network. The AZL partner companies and institutes present their technologies in speed dating presentations, review running and past joint AZL activities and vote for new activities.

AZL Partners can register at the AZL Partner Section:

>> login.azl-aachen-gmbh.de/dates
INTERNATIONAL CONSORTIUM STARTS STUDY ON TECHNOLOGICAL ANALYSIS OF ENERGY STORAGE SYSTEMS

In cooperation with 19 participating companies, the RWTH Aachen University and CONBILITY® GmbH, AZL Aachen GmbH has launched an international market and technology study on Energy Storage Systems. The study is still open to join.

**GLASS-FIBER COMPOSITES WITH EXTREME WEATHERING RESISTANCE**

Covestro develops polyurethane resins for cost-efficient production using pultrusion technology

Covestro is developing polyurethane resin matrix systems for fiber-reinforced plastics with extreme weathering resistance. These can be processed in a simple and cost-efficient way using pultrusion technology, and show excellent mechanical properties as well as good fire resistance properties.

By developing processes and products for manufacturing weather-resistant lightweight materials, Covestro offers excellent solutions for fiber-reinforced plastics, which can become fully protected from a variety of environmental influences. Desmocomp® is a new aliphatic polyurethane resin designed specifically for exterior applications. Thanks to its excellent weathering and UV resistance, the polyurethane resin matrix material protects composites from environmental influences such as sunlight and furthermore gives them very good resistance against chemicals or a salty environment. The pultruded material shows changes after more than 15,000 hours exposure in accordance with EN 13823) revealed that the composites fulfill flammability class B and is characterized by smoke generation class s1 and droplet formation class d0.

Besides this, pultruded parts based on Desmocomp® show anti-graffiti properties and good fire resistance. A single burning item test (SBI, in accordance with EN 13823) revealed that the composites fulfill flammability class B and is characterized by smoke generation class s1 and droplet formation class d0.

The one-component system can be easily processed using pultrusion technology. It enables very economic manufacturing of pultruded composites, since it offers a direct drop-in solution for establishing exemplary market segments and possible storage technologies. The study structure was presented on the basis of the two example technologies and applications of lithium-ion batteries in the automotive sector and power-to-gas technologies. In a workshop, the participating companies raised unanswered questions and provided initial impulses for focusing the study analyses by voting on relevant market segments.

Still open to join | Your Contact: Philipp Frohlig | philipp.frohlig@azl-aachen.gmbh.de

**WEATHERING RESISTANCE**

The kick-off meeting on January 30, 2018 opened the first phase of the study, which focuses on detailed market segmentation, including the identification of market requirements and potentials as well as existing and future technologies and their respective readiness levels. In addition to energy storage in the transport sector, the study will examine storage systems and technologies in other market segments. These include thermal, electronic, mechanical and electrical storage systems. At the kick-off meeting, participants were given a first market overview including the two example technologies and applications of lithium-ion batteries in the automotive sector and power-to-gas technologies.

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**ENERGY STORAGE SYSTEMS**

The kick-off meeting on January 30, 2018 opened the first phase of the study, which focuses on detailed market segmentation, including the identification of market requirements and potentials as well as existing and future technologies and their respective readiness levels. In addition to energy storage in the transport sector, the study will examine storage systems and technologies in other market segments. These include thermal, electronic, mechanical and electrical storage systems. At the kick-off meeting, participants were given a first market overview including the two example technologies and applications of lithium-ion batteries in the automotive sector and power-to-gas technologies.

*Hexcel’s prepreg system for the manufacture of leaf springs used in van, truck and SUV suspension offers clear advantages: weight savings of up to 70%, higher corrosion resistance, improved ride comfort. Compared with other solutions, Hexcel’s system offers a 50% cure time reduction and 15% higher mechanical performance.*
AZL SMART FACTS FOR YOUR MARKET INTELLIGENCE

As part of the Market Intelligence program of the Business Partnership, the AZL provides various analyses of composite business cases, market reports, conferences as well as smart facts on composite technologies. The entire analyses are available at the AZL Partner Section for AZL Business and Premium Partners.

The production of composite components, includes typically material costs of 75% to 85% of the total part costs.

Number derived from the AZL analysis of composite business cases in 2017.

AZL COMPOSITE BUSINESS CASES

In regular web conferences, AZL analyses composite components providing market numbers and smart facts, process chains as well as cost structures and cost drivers:

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

From 88 conferences which took place in 2017 having composite-based lightweight as the main topic, 17 of these conferences exclusively addressed composites in automotive applications and 2 in buildings and infrastructure applications.

NUMBER DERIVED FROM THE AZL CONFERENCE OVERVIEW

The information given includes organizational key facts on each event, the addressed material groups and markets, the type of presentations given, the organizer’s profile as well as additional activities such as exhibitions, conference dinner or matchmaking programs.

AZL MEETINGS IN 2018

January 25
COMPOSITES IN BUILDINGS & INFRASTRUCTURE
Initial Workgroup Meeting

January 30
ENERGY STORAGE SYSTEMS
Kick-Off Meeting of Joint Market & Technology Study

February 7
HIGH-SPEED RTM MATRICES
Workgroup Meeting

February 22
HIGH-PERFORMANCE SMC STUDY
Report Meeting

March 20
HYBRID THERMOPLASTIC COMPOSITES
Workgroup Meeting of Joint Market & Technology Study

April 19
AZL OPEN DAY
Guided Tours to 9 AZL research labs
+ Registration at lightweight-production.com

June
COMPOSITE BUSINESS CASES
Web Conference

June 6
HIGH-PERFORMANCE SMC
Workgroup Meeting

June 7
PIES & VESSELS
Workgroup Meeting

June 27 – 28
AZL ANNUAL PARTNER MEETING 2018
Discuss the activities of the last 12 months and define future topics and projects with us!

September 4
COMPOSITES IN BUILDINGS & INFRASTRUCTURE
Workgroup Meeting

September 26
HYBRID THERMOPLASTIC COMPOSITES
Workgroup Meeting

October
JOINT BUSINESS DEVELOPMENT TRIP TO USA
B2B Meetings at CAMX, US Networking Event
+ See Page 6

October 11
PIES & VESSELS
Workgroup Meeting

November
COMPOSITE BUSINESS CASES
Web Conference

November 13
HIGH-SPEED RTM MATRICES
Workgroup Meeting

November 14
HIGH-PERFORMANCE SMC
Workgroup Meeting

January 2019
EXECUTIVE NETWORKING EVENT
@BAU

Find more details on lightweight-production.com or the AZL Partner Section

WWW.LIGHTWEIGHT-PRODUCTION.COM
ACCESS TO LIGHTWEIGHT EXPERTISE AND EQUIPMENT @ THE RWTH AACHEN CAMPUS

In a walking distance of 1000 meters, the RWTH Aachen Campus comprises research along the entire value chain for composite-based lightweight production. AZL Aachen GmbH offers one-stop-shop solutions bringing together the numerous resources in equipment and know-how of its nine Partner Institutes. AZL provides services reaching from individual and exclusive projects over open innovation in joint projects and workgroups, business development and networking in its AZL Partnership to community offices offering access to RWTH Aachen University.

Besides the AZL Partnership, AZL offers individual industrial projects for exclusive development and consultancy involving the relevant lightweight expertise and equipment of its Partner Institutes.

THE AZL PARTNERSHIP: COLLABORATION BETWEEN INDUSTRY AND SCIENCE FOR LIGHTWEIGHT PRODUCTION

With the AZL Partnership, AZL enables the close cooperation between the lightweight industry and the research institutes of RWTH Aachen Campus. The AZL Partner Network consists of more than 80 industrial partners representing the entire lightweight production value chain from the raw material producer, over molders, manufacturing equipment suppliers, Tier 1 and Tier 2 to OEMs, from SMEs to large multinational corporations, from Germany to Mexico, China or Japan, from 21 different countries in total.

THE AZL PARTNER NETWORK: MORE THAN 80 COMPANIES FROM 21 COUNTRIES

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

JOINT AZL PARTNERSHIP ACTIVITIES

- Joint Business Development
- Cost Sharing in R&D
- Open Innovation & Networking
- High-Potential Networking
- On-Campus Community Offices

THE AZL DEVELOPMENT & CONSULTANCY SERVICES

Besides the AZL Partnership, AZL offers individual industrial projects for exclusive development and consultancy involving the relevant lightweight expertise and equipment of its Partner Institutes.

WE OFFER YOU
- Involvement of the relevant experts from RWTH Aachen University
- Efficient project management and contracts from a single point of contact
- Uncomplicated access to the equipment at RWTH Aachen University
- Identification of suitable industry partners who could co-finance your project

YOUR ON-CAMPUS COMMUNITY OFFICE

Through direct access to the RWTH infrastructure, you can expand your company with the expertise of numerous scientists and industry experts as well as machine halls with comprehensive and up-to-date equipment. At the campus you will be part of a network that not only consists of companies at the AZL, but also includes numerous member companies of other clusters and networks. In this hub, you identify trends and future employees at an early stage and present your company in an innovative context. In addition, publicly funded projects offer financing opportunities to pursue long-term projects.

YOUR DIRECT AZL CONTACT:
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