Driving new ideas, developing innovative solutions and meeting the latest standards comes down to one thing: making the right connections. Because there are no one-size-fits-all answers, DuPont works hand-in-hand with our customers to help them find optimal solutions to their specific needs. Among the biggest challenges facing many industries is how to reduce environmental impact while continuing to deliver quality products. A case in point is the automotive sector, with the focus on light weighting solutions that reduce carbon dioxide emissions without compromising performance.

The Key to Innovation Lies in Identifying the Right Mix of Different Technologies and Expertise

Multi-Material Design Approach –

No single material can help them achieve this goal – which is why holistic thinking and collaboration along the value chain is so important. It requires a multi-material design approach that supports material optimization by using the right material in the right place to achieve performance improvements, weight savings and cost reductions all at once.

In this regard, we see significant potential in the use of thermoplastic composites (TPC). They allow automakers to integrate lightweight materials selectively in specific areas of a vehicle. Vizilon® TPC is a growing family of thermoplastic composite solutions within the DuPont product portfolio. Our existing capabilities and enabling technologies, including predictive engineering, help us to position our Vizilon® TPC offering and develop novel solutions by pooling expertise with partners in the value chain.

An example of a successful collaboration in this area is our work with EconCore N.V. on the development of thermoplastic composite based honeycomb sandwich panels. Combining EconCore’s ThermoHex technology with DuPont™ Vizilon®, this collaboration has given shape to ultra-light sandwich panels that directly meet the needs of customers in sectors such as automotive, construction, leisure and energy. The panels demonstrate that strength, fitness and high rigidity can go hand in hand with lightweight and high-volume applications.

The key to spurring innovations such as these lies in identifying the right mix of expertise in materials, design, processing, and assembly techniques along the value chain. As an AZL-Premium Partner, DuPont values the center’s unique platform for engagement with different sectors and experts working at the cutting-edge of research. This is why we co-located our research activities at AZL in 2016 with a view to matching market needs with commercially viable innovations. DuPont’s on-going commitment to investing in future technologies is based on precisely these types of connections. Learn more about DuPont’s partnerships and innovations at Hall 5A, Stand E42 during JEC World 2017, 14-17 March or by visiting vizilon.dupont.com

Unique Design –

Architects have been asking for more light weight, high-strength, high-performance materials that can go hand in hand with lightweight and high-performance solutions. That is why holistic thinking and collaboration among different sectors and experts working at the cutting-edge of research are so important. This is why we co-located our research activities at AZL in 2016 with a view to matching market needs with commercially viable innovations. DuPont’s on-going commitment to investing in future technologies is based on precisely these types of connections. Learn more about DuPont’s partnerships and innovations at Hall 5A, Stand E42 during JEC World 2017, 14-17 March or by visiting vizilon.dupont.com


New office space for AZL Partners –

Buildings and Infrastructure Study –

New Schuler Press System at AZL

TGM is a Dutch construction company specialized in the installation of building façade systems. Over the years the company has been acting as subcontractor in multiple construction consortia in the Netherlands, completing a large number of office and residential buildings in the high end of the market.

Typically TGM is installing a complete façade solution onto the bare concrete building. This façade assembly includes structural components, insulation to heat and moisture, ingress protection, as well as elements that provide aesthetics.

Unique Design – Architects have been asking TGM for help to create buildings with unique and distinctive looks. For that reason, a solution based on composites seemed logical, as that provides architects with high flexibility to create novel shapes and designs. In addition, it brings to the building owner the interesting benefits of long service life and minimal maintenance.

A novel composite façade solution was first developed for the construction of the new Eurojust office building in The Hague, Netherlands. This project required the delivery of over 700 façade panels of multiple widths and lengths (ranging from 3.5 to 10 m).

Changing Requirements – Right from the start TGM involved composites design company Solico, resin suppliers Aliancys and BÜFA, and component manufacturer Indupol to develop the composite system and a reliable process for large-scale production. After having gone through several design iterations, the companies developed a compact proprietary composite system that met all the requirements. As an illustration: a mock-up of the assembly successfully passed fire testing and a real-life and very harsh mechanical attack by experienced vandals.

Smooth Productions and Installation – The composite components were made by Indupol through a hand-lay-up process in modular molds that were adjusted to the desired shape and dimensions, using resin from Aalicancys and BÜFA (delivered through Distributor Euroresins). After molding, the parts were treated with a topcoat in white color and transported to the job site for installation. With minimal use of scaffolding, the parts were lifted by a crane and attached onto the building.

Intervention: Lothar Gräbner, Vice President of Schuler Pressen GmbH

Machining of High Strength Steels and Shear Cutting of Composites

K2016 Production Cell

New SMC Products for Aircraft Industries

AXIA Materials Launches Pixel House® House Construction Solution with Composite Panels

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Unique and Innovative Building Façade System

Construction Company TGM Collaborated with Indupol, Aliancys, BÜFA and Solico to Create Novel Construction Technologies and a Great Composite Façade Project Example with a Unique Shape and Design.

Comment by Portia Yarborough

DuPont Performance Materials Outlines the Potential of High Volume Thermoplastic Composite Solutions and Presents the Results of Recent Developments Enabled by its Vizilon® Thermoplastic Composite Offering
LAST CHANCE TO JOIN STUDY ON BUILDINGS AND INFRASTRUCTURE!

AXIA MATERIALS LAUNCHES PIXEL HAUS®
A NEW WAY OF HOUSE CONSTRUCTION WITH COMPOSITE PANEL

Axia Materials has launched a new product called Pixel Haus®—a house construction solution with composite panels—aiming to provide a sustainable and efficient alternative to traditional building methods.

The Pixel Haus® uses Axia Materials' unique composite materials, which are designed to meet the demanding requirements for insulation, energy efficiency, and fire resistance. The solution combines lightweight and durable composite panels with advanced insulation technology, providing a comfortable living environment while reducing the environmental impact of building construction.

**The Future of Building:**

The Growing Use of Composites in Construction

The Paris-based JEC Group, which organizes the JEC World conference, has released a report highlighting the growing adoption of composites in the construction sector. The report, titled "New Potentials for Composite Technologies in Buildings and Infrastructure," indicates a significant increase in the use of composite materials in the construction industry, driven by their lightweight, durable, and sustainable properties.

The report highlights the potential of composites in various applications, such as building panels, roofing systems, and interior partitions. It also discusses the challenges and opportunities associated with the integration of composites into building codes and regulations.

**Installation of Pixel Haus®:**

The installation of the first Pixel Haus® demonstrates the potential of composite materials in the construction industry. The solution combines lightweight panels with advanced insulation technology, providing a comfortable living environment while reducing the environmental impact of building construction.

**The JEC Group:**

The JEC Group is an international organization that promotes the development and use of composite materials in various sectors, including aerospace, automotive, construction, and marine. The JEC World conference is the largest and most comprehensive event dedicated to composites, attracting thousands of professionals annually.

**For More Information:**

For more information on the Smart, Sustainable and Safe building solutions, visit the JEC World website or contact the JEC Group directly.

**Contact:**

Mr. Mafeld, Managing Director
m.mafeld@jecycleurope.com

**Visit:**

JEC World 2022, April 4-6, Paris, France
www.jecworld.com
To obtain an astonishing performance at moderate fuel consumption and low emission values, Porsche relies on lightweight materials. The rear apron is composed of a density optimized Polyurethane mixed with 3M Glass Bubbles and ground carbon fibers.

The weight reduction with 3M Glass Bubbles – The weight reduction of the rear apron is a result of the incorporation of the uniform hollow glass microspheres. Those are made out of a water-insoluble borosilicate glass, featuring low density at an extreme (hydrostatic) pressure resistance. Further the microspheres are combined with ground carbon fibers. The mixture of tiny fibers and spherical Glass Bubbles enables the manufacturing of a Polyurethane part with almost isotropic mechanical properties and high toughness.


Bubbles enable the reduction of the specific weight of a part up to 0.6 g/cc. As a filler for e.g. thermoplastic compounds, 3M Glass Bubbles enable the manufacturing of a Polyurethane part with almost isotropic mechanical properties and high toughness.

Light and dimensional stable – To broaden the field of applications the portfolio of 3M Glass bubbles is screened continuously. The nominal densities of the different types range between 0.25 g/cc and 0.6 g/cc. As a filler for e.g. thermoplastic compounds, 3M Glass Bubbles enable the reduction of the specific weight of a part up to 25%. Thereby it’s possible to efficiently produce lighter plastic parts with high dimensional stability and surface quality.
In order to maintain Germany as a global leader in economic and energy sectors, lightweight construction is promoted as an innovative approach. The ‘lightweight construction atlas’ (www.leichtbauatlas.de) is an interactive portal that illustrates the lightweight-construction-related skills in Germany for all materials, technologies, and sectors. Organisations can present their processes and activities on this website. The atlas helps in particular enterprises and research institutions to find local lightweight-construction solutions that meet their needs. For this purpose, a catalogue comprising around 250 criteria has been elaborated in close cooperation with business and academia for the targeted search for suppliers and partners. A search tool and a map of Germany serve as an additional incentive. I would like to contribute as German entities to seize this opportunity and to present your company with its skills on this platform. The innovative potential of your sector and our support contribute to strengthening Germany’s industrial base in the long term.

Lightweight construction office – In the coming months, the lightweight construction office will start its work on behalf of the Federal Ministry for Economic Affairs and Energy. It is to serve as a national and international hub for lightweight construction and to help German companies, especially SMEs, to share knowledge and establish contacts. It provides platforms for the technology-neutral Central Innovation Programme for SMEs (ZIM), the Industrial Collective Research (IGF) programme, and funding programmes for the aerospace sector, the automotive industry, and the railway sector.

The recently launched Business Platforms provide technology-related information, established suppliers as well as innovative development partners for various lightweight technologies. Visit the lightweight technology websites for an easy entry into Thermoplastic Composites and High-Speed RTM.

With background information and use cases for each technology as well as an overview of products and services, these websites inform on existing solutions and function as a one-stop-shop to find suppliers and partners along the entire value chain. The websites are jointly built up by the AZL Partner Companies representing the entire value chain of lightweight production. In 2017, Business Platforms for High-Performance SMC and Composite Pipes and Vessels will be launched.

Within the last decades, lightweight design has evolved to an advanced state, leading to highly optimised structures used to capacity. If those structures are damaged due to fatigue or accidental events (e.g. impacts), damage progression has to be considered. Hence, it is essential to detect damage during the uncritical stage, leading to high monitoring effort (e.g. performing regular inspections).

Structural Health Monitoring (SHM) is the automatic service monitoring of structural condition. It is a tool to guarantee structural integrity, while reducing the amount of inspections. Since there are various obstacles, successful SHM needs a holistic and interdisciplinary approach. It is not sufficient just to attach a sensor to a highly stressed region of the structure. Recorded data need to be transmitted, processed and evaluated. Therefore, the system needs an innovative power supply, e.g. achieved by energy harvesting. In addition, sensor application during the manufacturing process of the structure should be considered. For example, integration of the sensor in two different layers of composite materials is beneficial since it leads to a protected sensor. Deepened structural analyses provides data for optimizing sensor position with respect to sensor sensitivity.

In order to cover all of these aspects, the Institute of Structural Mechanics and Lightweight Design (SLA) founded an interdisciplinary consortium consisting of 14 research institutes of the RWTH Aachen University. A thin-walled drive shaft made out of glass fibre reinforced plastics (GFRP) is chosen as a demonstrator. Due to the low thickness to diameter ratio, torsional buckling limits the load carrying capabilities. An accidental event such as an impact may damage the material and thereby reduce the buckling load.

In order to detect impact damages, fibre optical sensors, produced by the Fraunhofer Institute for Production Technology IPT, are integrated during the braiding process at the Institute of Textile Technology (ITA). Their positions and directions are optimized using numerical analyses (see Fig. 1) at the SLA with respect to sensor sensitivity. The impact damage (see Fig. 2) is introduced at the Institute for Automotive Engineering (ika) by using an impact tower. Static and dynamic tests of the damaged drive shafts are scheduled afterwards at the Institute for Machine Elements and Machine Design (iME). Metallic load introduction sleeves, designed by Institute of Wicking and Joining (ISF), are directly joined during braiding process. The Institute of Communication Technologies and Embedded Systems (ICE) investigates the damage information and evaluated. Therefore, the system needs an innovative power supply, e.g. achieved by energy harvesting. In addition, sensor application during the manufacturing process of the structure should be considered. For example, integration of the sensor in two different layers of composite materials is beneficial since it leads to a protected sensor. Deepened structural analyses provides data for optimizing sensor position with respect to sensor sensitivity.

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The AVK (Federation of Reinforced Plastics e.V.) represents the interests of manufacturers and processors of reinforced and filled plastics, engineering thermoplastics as well as their raw materials suppliers on a national and European scale. Elmar Witten, Managing Director at AVK and Volker Mathes, in charge of Business Development at AVK, summarize latest trends of the GRP and GFRP markets drawing on Composites market report 2016 and the results of the 8th Composites market survey of Composites Germany.

Elmar Witten:
The term GRP refers to all glass fibre reinforced thermoplastics. They have a share of more than 45% of the complete market. The next bigger segment is the Short Fiber Reinforced Thermoplastics. They have a share of more than 40% of the complete market. The next bigger group are the GFRPs with a volume of 1.096 kt. The term GFRP refers to all glass fibre reinforced plastics with a thermostet matrix as well as glass mat reinforced thermoplastics (GMT). The "Infusion" market reaches a level of 350 kt and last but not least CRP had a production volume in Europe of 35 kt. Besides are there other materials like Natural Fiber Reinforced Composites or ceramic composites for example. The GRP market is the market-segment we mention when we typically talk about the GRP-Market.

How is the market allocation of the different Composites material?
The AVK together with their partners CCcV (Carbon Composites e.V.) and AMAC (Advanced Materials and Consultancy GmbH) collects data concerning the European Composites Market. The following figure refers to this data.

The whole European market reaches a level of about 2.850 kt in 2016. This is a little less than 3/4 of the world production. The biggest single segment in this market is the Short Fiber Reinforced Thermoplastics. They have a share of more than 40% of the complete market. The next bigger group are the GFRPs with a volume of 1.096 kt. The term GFRP refers to all glass fibre reinforced plastics with a thermostet matrix as well as glass mat reinforced thermoplastics (GMT). The "Infusion" market reaches a level of 350 kt and last but not least CRP had a production volume in Europe of 35 kt. Besides are there other materials like Natural Fiber Reinforced Composites or ceramic composites for example. The GRP market is the market-segment we mention when we typically talk about the GRP-Market.

The complexity and high variability of concepts for designing parts and production scenarios is unique for composite applications. This is valid for the typical composite-processes and becomes even more a key-challenge when it comes to multi-material design.

In short, GRP production in Europe continues to shift towards Asia and America over this period. Processing of commodities has grown by 2.5%. The share of global composites production continues to Europe. The long-term trend for GRP production therefore tends to follow the growth of the economy as a whole. Nevertheless, no rapid expansion of production (similar to that seen in the CRP segment) is to be expected in the near future. This is partly due to the very considerable level of existing production and also the fact that fluctuations in one industry are usually "smoothed out" by other applications. Especially the thermoplastic production technologies as well as the RTM-Technology have gained special interest and an increase in production volume.

What are the upcoming trends?
Volker Mathes: As the results of the 8th Composites market survey - published by Composites Germany - show the general business situation is largely seen as positive in the composites market. When asked to assess the general business situation in three regions - Germany, Europe and worldwide - the respondents came to highly positive conclusions. For example, 84% of respondents see the current worldwide business situation as positive. Beyond 29% said they were expecting an increase in production volume. Beyond 30% saw their current worldwide business situation as positive. Beyond 29% said they were expecting a positive development has stagnated at 9%. As a conclusion the survey shows that the respondents see their prospects as very positive for the coming months. The market is therefore likely to continue in its dynamic development - all the more so as half of all respondents believe that their businesses will become more active on the market, while only 2% are anticipating a decline.

These each consume around one-third of total production and play a major role in national economies. The long-term trend for GRP production therefore tends to follow the growth of the economy as a whole. Nevertheless, no rapid expansion of production (similar to that seen in the CRP segment) is to be expected in the near future. This is partly due to the very considerable level of existing production and also the fact that fluctuations in one industry are usually "smoothed out" by other applications. Especially the thermoplastic production technologies as well as the RTM-Technology have gained special interest and an increase in production volume.

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To promote lightweight and composite related technologies of our AZL Partner Companies in new markets and new regions, the AZL Partner Network has decided to launch a new collaborative model for Joint Business Development. For the first year, Eastern Europe with a focus on Poland was selected to be the region for extended matchmaking. With the entry to the EU, Poland has developed to an increasingly attractive destination for foreign direct investment (FDI) for global companies and has experienced a growth of foreign trade which almost expanded ten-fold. Being an important producer of finished passenger cars and buses, the automotive industry is one of the leading trading sectors in Poland. At the same time, Poland has a history with glass fibers and composites. From October 12th to 13th, AZL Business and Premium partners will participate in B2B meetings at the largest Eastern European composite show, Kompozyt Expo 2017 in Kraków, a subsequent networking dinner and guided tours to Polish composite companies.

More than 60 Partners in Germany, United Kingdom, France, Belgium, Netherlands, Spain, Italy, Sweden, Austria, Luxembourg, Switzerland, Denmark, Estonia, North America and the Middle East.

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More than 60 Partners in Germany, United Kingdom, France, Belgium, Netherlands, Spain, Italy, Sweden, Austria, Luxembourg, Switzerland, Denmark, Estonia, North America and the Middle East.
Huntsman’s VITROX® Resins Used in Complex Hollow Part for KTM Motorcycle

Huntsman Polyurethanes’ VITROX® resin technology has been used to create an ultra lightweight license plate holder for the KTM 1290 Super Duke R motorcycle – a high performance bike with a powerful 1300 cc / 170 HP engine.

The innovative license plate holder was created as part of Project R.A.C.E, an industry initiative led by KTM Technologies, an engineering company with extensive know-how about the use of composite and hybrid materials and their application across a wide range of industries. KTM Technologies cooperated for the project with The Hennecke Group, which designs, produces and installs custom polyurethane mixing machines and innovative systems and technologies. Project R.A.C.E is exploring the industrialization of the award-winning CAUSV technology – an end-to-end manufacturing methodology for producing complex, hollow, fiber-composite structural parts using automated high-pressure resin transfer molding (HP-RTM). KTM Technologies’ CAUSV technology brings together a range of best-in-class technologies and materials including Huntsman’s VITROX® resins. To demonstrate the potential of the CAUSV technology to create lightweight, mechanically strong parts that are suitable for high volume production, KTM Technologies and The Hennecke Group are working with a selected group of industry partners to produce a range of products. One of the team’s first challenges was to create a license plate holder for KTM’s Super Duke motorcycle, which is renowned for its acceleration and therefore requires a high level of lightweight, high performance components.

The existing series KTM solution for the license plate holder weighs more than 765 grams. However, using CAUSV technology, RTM Technologies and its Project R.A.C.E partners produced a high performance and high integrative part weighting only 265 grams – a saving of more than 60%.

Huntsman’s VITROX® resin technology has proved central to Project R.A.C.E and the development of KTM’s new license plate holder. Suitable for HP-RTM processing, this innovative polyurethane-based matrix material has unique map cure capabilities – meaning manufacturers can carefully control the resin curing process and achieve a full cure within minutes. Hubert Reitberger, Product Manager for Advanced Composite Resins at Huntsman, said: “Project R.A.C.E is an excellent platform where high-speed polyurethane matrix materials such as VITROX® resins can demonstrate their full performance. Self-releasing systems with outstanding mechanical properties, combined with optimized curing times, are the key to mass-producing products with a short cycle time. Project R.A.C.E and the application of KTM Technologies’ CAUSV technology is a prime example of how highly specialized partners can come together to create a step change in the production of fiber composite hollow parts.”

Alongside KTM Technologies, The Hennecke Group and Huntsman, other companies involved in Project R.A.C.E include H2K Minerals (now REINSICHT), the Institute of Aircraft Design Stuttgart; ENGEL Austria; Persico; and Murt-f&H Plastics.

Krisitan Seidel
Ilse_vanden_brande@huntsman.com

AZL WORKGROUP: HIGH-SPEED RTM MATRICES

RTM is the current state of the art technology in high-volume production of thermoset composite parts. After three workshops on “High-Speed RTM Matrices”, AZL partners founded a workshop which meets every six months. The aim of the workshop is to enhance the trust in the RTM technology and the composite industrialization in general. Recently, a consistent Model Data Sheet for RTM resins has been developed for speeding up process- and part developments. Furthermore, the need for e.g. near process test methods, quality assurance possibilities, automated preforming or for a material, machinery and process database will be identified for next projects.

Nicole Stroex | Polynt Composites
nicole_stroex@polynt.com

NEW SMC PRODUCTS FOR AIRCRAFT INDUSTRIES

With FAR 25 Approval: SMC Can Be Co-Molded with UD or Fabrics in order to Give More Stiffness to the Final Component.

The aviation industry is one of the branches with the highest growth during the last years. Lightweight design and the use of lightweight materials such as carbon fiber reinforced plastics are important key aspects for meeting the rising need for fuel-efficient civil aircraft in the future. For the cost-efficient and lead-time-related production of aircraft structures or components the development of innovative manufacturing technologies is necessary. In this context the combination of pre-impregnated continuous fiber reinforcements and sheet molding compounds reinforced by long fibers in a one-shot compression process is really promising. By using this hybrid material and this process technology functional and lightweight composite components can be realized in a cost-saving way and with short lead times. The direct implementation of metal components such as inserts, shelves and plates promises further functional integration. Polynt Composites has invested many efforts in research and development for new class of thermoset reinforced materials to react to the increasing aircraft market requests. In particular it has been launched a new range of SMC for aircraft industries in its German plant in Miehlen (near Frankfurt) such as: HUP 27. The SMC described by HUP 63 is developed for the fire containment requirements for cargo areas and fulfills the FAR requirements according FAR 25 App. F Part I + V and the AIMT 3.005. And HUP 63: The SMC described by HUP 63 is developed for the fire containment requirements for cabin and interiors and fulfills the FAR requirements according FAR 25 App. F Part I + V and the AIMT 3.005.

Both SMC can be co-molded with carbon fiber reinforcement (fabric or unidirectional) impregnated with the same thermosetting resins in order to give the same continuity on the organic phase.

Nicole Stroex | Polynt Composites
nicole_stroex@polynt.com

AZL WORKGROUP: HIGH-Performance SMC

The drive to further weight savings and significant reduction in CO2 emissions require a next generation of High-Performance SMC (Sheet Molding Compound) with short and continuous fiber-reinforced systems using both carbon and glass fibers with customised resin compounds. These materials will bridge the gap between very cost-effective metallic parts and continuous fiber-reinforced parts with the highest lightweight potential. Class A body panels and semi-structural parts for automotive and various industrial applications are the key target for HP-SMC. The workshop defined a joint road map to build a product development toolbox including material characterization methods, standards, norms and design guidelines. The Business Platform for promotion of the related products and services of AZL partner Companies will be launched soon.

Nicole Stroex | Polynt Composites
nicole_stroex@polynt.com

NEWSLETTER #8/2017

>> high-speed-rtm.com

Valery Brandes | Huntsman Polyurethanes / Business Communications Manager Europe
valery.brandes@ Huntsman.com

Next Workgroup Meeting: September 28th, 2017

World-renowned lightweight vehicle project

The project epilon aims to conceptualise and prototype the electric urban small vehicle of 2020-2025 and defining a new vehicle class.

Within the epilon project an innovative electric vehicle concept specifically designed for the typical commuting and transport tasks in urban areas has been developed. The epilon vehicle provides NCAP safety level with a structural weight of only 680 kg, while providing space and comfort for three passengers. Chassis and drivetrain offer exciting driving performance (0-100 km/h in under 10 s) and 150 km range with an energy demand of just 80 Wh/km. Thus epilon closes the gap between ultra light vehicles (L7e) and conventional passenger cars (M1) and offers efficient and at the same time save mobility.

To achieve the ambitious energy efficiency and safety goals, special focus has been set on the design of the vehicle body structure. The epilon concept incorporates a novel CFRP-aluminium space-frame architecture. Using the technology Aixtron by partner Axion continuous multi-chamber CFRP beams can be manufactured by bonding carbon fiber preforms over foamed polymer cores which are thus stacked and overbraided, filled with resin and cured in an autoclave. The resulting profiles are applied in the space-frame body in white (BIW) architecture to form a cell enclosing the passenger compartment. This construction is combined with modules made out of aluminium extrusion tubes as crash absorbing structures for front, rear and side impacts. This space-frame is supported by a number of sheet panels, closing the frame to a robust structure, suitable to withstand the requirements concerning stiffness and crash safety. Furthermore, CFRP exterior panels have been designed, reflecting the proposed styling but not adding to the structural performance of the body structure. In terms of lightweight design also a stiff CFRP hybrid rear axle concept has been developed making use of braided pre- and a novel positive fitting joining concept. The epilon concept’s performance with regard to the project objectives concerning safety, energy efficiency and driving dynamics has been proven on prototypes, including sub-systems, a fully body crash structure and a running vehicle prototype.

Kristian Seidel
kristian.seidel@RWTH-aachen.de

At JEC World 2017: Hall 6 | Booth C79

CFRP VEHICLE

EPSILON – SMALL ELECTRIC VEHICLE CONCEPT

The project epilon aims to conceptualise and prototype the electric urban small vehicle of 2020-2025 and defining a new vehicle class.

Within the epilon project an innovative electric vehicle concept specifically designed for the typical commuting and transport tasks in urban areas has been developed. The epilon vehicle provides NCAP safety level with a structural weight of only 680 kg, while providing space and comfort for three passengers. Chassis and drivetrain offer exciting driving performance (0-100 km/h in under 10 s) and 150 km range with an energy demand of just 80 Wh/km. Thus epilon closes the gap between ultra light vehicles (L7e) and conventional passenger cars (M1) and offers efficient and at the same time save mobility.

To achieve the ambitious energy efficiency and safety goals, special focus has been set on the design of the vehicle body structure. The epilon concept incorporates a novel CFRP-aluminium space-frame architecture. Using the technology Aixtron by partner Axion continuous multi-chamber CFRP beams can be manufactured by bonding carbon fiber preforms over foamed polymer cores which are thus stacked and overbraided, filled with resin and cured in an autoclave. The resulting profiles are applied in the space-frame body in white (BIW) architecture to form a cell enclosing the passenger compartment. This construction is combined with modules made out of aluminium extrusion tubes as crash absorbing structures for front, rear and side impacts. This space-frame is supported by a number of sheet panels, closing the frame to a robust structure, suitable to withstand the requirements concerning stiffness and crash safety. Furthermore, CFRP exterior panels have been designed, reflecting the proposed styling but not adding to the structural performance of the body structure. In terms of lightweight design also a stiff CFRP hybrid rear axle concept has been developed making use of braided pre- and a novel positive fitting joining concept. The epilon concept’s performance with regard to the project objectives concerning safety, energy efficiency and driving dynamics has been proven on prototypes, including sub-systems, a fully body crash structure and a running vehicle prototype.

Kristian Seidel
kristian.seidel@RWTH-aachen.de

At JEC World 2017: Hall 6 | Booth C79
CONTINUOUS PRODUCTION PROCESSES OF TOMORROW

Berndorf Band Group: Highly Precise Steel Belt Systems from Austria

All over the world, the high quality steel belts and process systems of Berndorf Band Group are considered to be a technological standard. The latest development is a modular double belt press which allows for a continuous and particularly efficient production of most different flat-sheet products in the composite area. Within the scope of feasibility tests, customers can directly convince themselves of the advantages of this press type in the Research & Development Center in Berndorf.

Steel belt systems: A versatile production technology – No matter if laminate manufacturers, testing centers of the automotive industry or producers of chemical products – they all rely on individual steel belt solutions of Berndorf Band Group. “We support everything from the identification of suitable process parameters to the implementation of customized systems and their maintenance. Extensive service as well as research and development are an important part of our customer-oriented corporate philosophy”, explains Gernot Binder, president of Berndorf Band Engineering GmbH. On the basis of this philosophy, a new system has now been developed, especially for the plastics industry. It allows for an even more efficient production of flat-sheet products such as thermoplastic composite materials.

More output with high flexibility: Continuous instead of static pressing – In many cases, static processes with cycx presses are used in the production of composite products. Double belt presses, on the other hand, allow for a continuous production process multiplying the production capacity and at the same time reducing the energy demand. In this connection, continuously supplied material is pressed between two endless steel belts running over four drums under targeted temperature influence. The material can be supplied in many different forms, e.g. as powder, granulate, rolled stock, mat, cast solution or tough mass.

The modularity of the system allows for the combination of any number of modules and components. On the one hand, different work steps can be carried out on one single production line thanks to this flexibility. On the other hand, the system can be adjusted to requirements of different products thanks to the fast and easy exchange of the modules without belt removal. In this connection, you can combine calender, roller, roller carpet and sliding modules which can reach process temperatures of up to 400 degrees Celsius.

Roller carpet modules generate pressures of up to 2 MPa and sliding modules of up to 0.2 MPa. Roller modules generate a line pressure of up to 15 kN/m and calendar modules of up to 60 kN/m. Due to the hydraulic generation of the compressive forces in the modules, the press can be operated in an isobaric and isochoric manner. In order to be able to adjust pressures even better to the needs of thermoplastic composite materials, Berndorf Band Group strives for an intensive exchange with material manufacturers and producers.

Test procedure in Berndorf: New steel belt press and competent consultation – In the Research & Development Center in Berndorf, Austria, customers can already convince themselves of the modular double belt press during the material and product development. Due to the flexible arrangement of the modules, individual production processes can be realized and checked for their effectiveness. In the area of thermoplastic composite materials, some flat-sheet products could already be produced in continuous form, e.g. CFRP (with PEEK, PA6, PP and PE), GFRP (with PAs, PP & PE) as well as organic sheets.

Peter Riedl | Berndorf Band GmbH | Sales Manager | pri@berndorf.co.at

AZL JOINT PARTNER PROJECT: DOUBLE-BELT PRESSES

The project aims at improving the energy efficiency and product geometry flexibility in production of composite sheets with double-belt presses. In 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 just started to progress on the developed double-belt press system with the aim to build an industry-scaled machine according to the pursued concepts.

Your AZL Contact: Albert Wendt | albert.wendt@aul.rwth-aachen.de.

At JEC World 2017: Half Sa 1 Booth C70 Lecture on March 15th, 10:00 a.m.

AZL JOINT PARTNER PROJECT

ULTRA-FAST MANUFACTURING OF TAILORED COMPOSITE BLANKS

To increase resource-efficiency in the production of continuous fiber-reinforced plastics, the manufacturing of scrap-optimized blanks with defined fiber alignment (“tailedored 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 was initiated at the Annual Partner Meeting and aims to realize a novel machine solution for the high-volume production of tailored composite blanks with output rates in the range of 300 kg/h. Your AZL Contact: Thomas Weiler | thomas.weiler@aul.rwth-aachen.de.

MAJOR EQUIPMENT EXPANSION AT VAN WEES UD AND CROSSPLY TECHNOLOGY

The successful pilot productions at Van Wees have led to the sales of the first thermoplastic UD tape production machine and the decision to close the chain for composite tailored blanks production with a new machine and equipment.

From 2014 onwards, Van Wees has noticed a continuous growing demand for the production of thermoplastic resin based UD tapes. In its Research and Technology Center (R&TC) the UD tapes can be made on three different machines. The width is 600 mm maximum and these rolls can be slit in-house to smaller width. The UD600 TPR is used on daily basis and several tons of UD tapes are already made for interested parties. These tapes are used for evaluation of the customers resins and fibers. By running the machine for longer periods, the customer can experience the equipment capabilities, develop its products and the operators will be trained for a smooth startup when the machine is installed.

The Van Wees R&TC machine is recently equipped with a double belt calender with steel cooling belts. This addition has increased the tape quality due to better control of the process variables. It also opens new possibilities for making thicker tapes, multi-materials and other lamination processes.

The R&TC will be expanded with a new UD placement machine. For making tailored blanks, a multi-angle ply cutting machine and welding equipment are present. The plies from this machine are manual welded according to the ply book configuration. The panels can be made with these laminates on a press of 800 x 500 mm. Van Wees has built two Crossply machines, one in 2012 and one in 2014 for its R&TC. The first one was a large Multi-axial UD machine, working width 1.800 mm and the later version was a robot based unit. Both machines were not according to the performance and operational wishes and therefore a new design is made. Using the experience from the “old” versions, a new generation machine is configured in which all knowhow is bundled. This high automation machine will be operational after the summer of 2017.

Van Wees always welcomes ideas for testing on its equipment and recently performed new trials with flax fiber based UD tapes. Having worked 2 – 3 years on this product from 2010 onwards, but without success in the market, it is good to notice that also this material is gaining interest again.

Rien Van Den Aker
Van Wees UD and Crossply Technology | Director | rienvandenaker@vanwees.nl
MULTI-MATERIAL SYSTEMS

PETER EGGER:
“IN-SITU POLYMERISATION ON THE ROAD TO SERIES PRODUCTION”

In order to close the gap to an efficient production of fabric or fibre-reinforced light-weight composites, Engel realised an integrated and highly automated process for the in-situ polymerisation of Caprolactam to form fibre composite carrier structures which are functionalised through injection moulding. The multi-component process uses fibre fabric, K-Caprolactum and thermoset plastic granules to create lightweight, ready-to-fit parts. Peter Egger, Division Manager of the EMMEGI Centre for Lightweight Composite Technologies explains the advantages of in-situ polymerisation.

“In-situ polymerisation offers major opportunities for us when it comes to producing complex composite parts as efficiently and cost-effectively as possible. Generally speaking, various procedures are available. The multi-stage approach, employing pre-consolidated semi-finished products which are trimmed, heated, shaped and moulded is useful where waste can be kept to a minimum and no local reinforcements are needed to improve stiffness and strength. Reactive processes, which include HP-RTM and in-situ polymerisation, offer advantages in connection with complex lay-up conditions, hollow profiles and hybrid layer structures. However, additional functionalisation as regards the HP-RTM process is relatively complex. The resulting components are based on epoxy resin or polyurethane so that typically, joining elements and reinforcing structures need to be manufactured separately and fixed to the structural component. On the other hand, in-situ polymerisation processes like polyamide 6, onto which functional elements can be moulded directly. In-situ technology therefore enables us to improve production efficiency while following the trend towards an increased use of thermoplastic matrix materials.”

DEVELOPMENT OF A FULLY AUTOMATED ADHESIVE BONDING PROCESS

Consideration of Large-Scale Manufacturing Conditions – with the Use of Laser Irradiation as Pre-Treatment Method for FRP

The increasing application of material mixture results in a growing importance of the adhesive bonding technology as the most promising joining technique for multi-material joints. Until now, the use of adhesive bonding for multi-material joints is, however, connected with high process technological expenditure and the successful implementation in individual applications, the methods have not yet been sufficiently developed for large-scale manufacturing. One of the most important challenges is the provision of robust surface pre-treatments in order to ensure efficient and durable adhesively bonded joints. Furthermore, methods have to be developed which make it possible to achieve the handling stability of the joined components within a very short time. The development and implementation of this methods into the adhesive bonding process remains challenging under the boundary conditions of large-scale manufacturing. Despite the ongoing and funding initiative (ISF) at RWTH Aachen University, a process chain in laboratory size was developed and built (see figure 1). In this process chain components of FRP and metal are adhesively bonded fully automatically. The process chain includes a 6-axis industrial robot, a vacuum gripper system, a CO₂-laser in the pre-treatment of fibre-reinforced plastics, an adhesive dosing unit for processing 1K or 2K adhesive cartridges, a joining device and an induction system for accelerated curing of the adhesive joint. Alternatively, an atmospheric pressure plasma system can be used for pre-treatment instead of the laser system. With this existing opportunity, bonding and related joining processes between various materials can be tested for feasibility studies. Additionally, it is possible to gain detailed information about the process in terms of e.g. process time, reproducibility, practicality and economicality.

Free to contact us, if you are interested in the development of modern adhesive bonding process chains, related processes as thermal direct joining, hybrid joints of FRP and pin structurised metals, repair concepts for FRP or smart structural health monitoring (SHM) systems (see figure 2).

NOVEL LASER-BASED PROCESSES FOR JOINING AND CUTTING OF HYBRID COMPOSITE-METAL COMPONENTS


Hybrid injection molding of laser microstructured metal components – Over the past years Fraunhofer ILT has developed a process chain to connect plastic with metal, in which microstructures are generated in the metallic bonding partner by means of laser radiation. In collaboration with BARLOG GRUPPE the modified metallic parts were integrated into an injection molding process in order to fill the cavities directly with microstructured plastic. After the plastic solidifies, a solid and permanent bond is created based on mechanical interlocking. To evaluate the connection different structure patterns and process parameters with various plastic materials were tested. This process chain has produced durable and solid connections with a tensile shear strength of more than 22 MPa. The strength of the joint is not only significantly influenced by the structural density and orientation on the metal part and the plastic material properties, but also by the process control and the metal components temperature during injection molding.

Laser cutting for joining preparation – Some joining techniques as riveting or form locking joints need a precise contour or edge preparation of the joining partners. For the preparatory cut of metal and composite parts the laser can be used, offering the versatility to provide adapted processes for the very differing material properties. Applications can be cutting of holes in already stacked components of titanium or aluminium and CFRP for riveting or contour cutting for combined form locking and adhesive joints.

The cutting method for CFRP is an ablation process, removing material to the top side in several scans digging a kerf into the material by the focused laser beam. In case of stacked material, a scan strategy is chosen that generates a kerf down to the metal part with a contour optimized for the following process step, the metal cutting. For this a gas assisted single path process is employed with adapted processing parameters. A smooth link between the components is reached for stacked material as well as for material side by side in butt joints with an interlocked contour. This novel cutting process combination was demonstrated with the same beam source both for CFRP and metal, but for technical or economic reasons a solution with different lasers might also be attractive depending on the application.

In-Situ Polymisation Offers Major Opportunities

Peter Egger
ENDEL-ALUSTRA GmbH | Division Manager Center Lightweight Composite Technologies | peter.egger@engel.at

Fig. 2: Adhesive bonding and related processes at IFD

AZL WORKGROUP; HYBRID THERMOPLASTIC COMPOSITES

Production processes combining continuous and short or long fiber reinforcements allow a high design flexibility as well as good mechanical properties at the same time. Thus, overmolding of FRP inlays is a popular process to functionalize thermoplastic semi-finished products and local reinforcement by uni-directional tapes increases significantly the performance of plastic components. The AZL workgroup “Hybrid Thermoplastic Composites” faces technological challenges such as thermal management, forming control, handling and fixation, trust in technology and cost-efficient design.

From the next meeting:
October 10th, 2017
Next Workgroup Meeting:
WWW.LIGHTWEIGHT-PRODUCTION.COM

OCTOBER
PETER EGGER:
THE ROAD TO STATEMENT

SERIES PRODUCTION”

LIGHTWEIGHT COMPOSITES

www.lightweight-production.com
STATE OF THE ART – Lightweight structures are used not only for weight reduction and, thus, for the implementation of legal requirements such as lower CO₂ emissions in the automotive sector, but also for the integration of functional elements. In view of the above-mentioned requirements, injection molding of thermoplastics is highly suitable. Injec-
tion molding allows a high level of design freedom, short cycle times and the implemen-
tation of continuous fiber structures. The FiberForm process developed by KraussMaffei (Figure 1) combines thermoforming of organic sheets and injection molding in one process. The results are weight-reduced, fiber-reinforced plastic compo-
nents with high strength.

CHALLENGES – Economical use of FiberForm tech-
nology largely depends on the automation concept, the heating concept and the size of the injection unit (Table 1). Due to different process-varying components, the effect which the individual cost factors have on component prices changes.

MANUFACTURING CONCEPTS – Based on the chal-
 lenges, KraussMaffei has developed three concepts for three different organic sheet sizes (Table 1). The concepts are developed based on low cycle times, minimal installation space, flexibility and low component costs. Characteristics of all Fiber-
Form concepts is the positioning of an infrared heating station above the fixed clamping plate. Thanks to this heating concept, very short transfer moves are possible to insert the heated organic sheet into the molding tool. This results in very short transfer times of the organic sheet into the tool and therefore facilitates high series production of the components. The infrared tech-
nology is used as a heating principle. Depending on the thickness of the semi-finished product, heating takes place on one side or both sides. The dimensions of the infrared heating area depend on the size of the organo sheet and the corresponding injection molding machine, but can also be cus-
tomized. Two decoupled robot units are defined as automation kinematics. As a result, heating of the organic sheet and removal of the finished part can be decoupled from one another in terms of time, which leads to a further reduction in the cycle times. Due to the different component sizes, the robot kinematics differ in terms of their freedom of movement and their load capacities.

KraussMaffei’s product-oriented automation con-
cepts ensure series production of long fiber-rein-
forced thermoplastic components in very short cycle times for large quantities. The reasons for this are as follows: selection of infrared technology as a heating principle, positioning of the infrared heating station above the injection molding machine and optimized selection of the automa-
tion kinematics for different component sizes. All presented concepts have already been imple-
mented for customers in series production by KraussMaffei.

K 2016 PRODUCTION CELL NOW AT IKV
With New Tape Plant

Due to the increasing individualization in pro-
duction, variant production gets increasingly important. Hence, the Institute for Plastics Processing at the RWTH Aachen (IKV) pre-
 sented a production cell for the production of individualised composite parts at the K2016, shown together with an industrial consortium (Figure 1).

Individualised hybrid injection moulding (© IKV)

Using the example of a bicycle saddle, six different variants could be produced fully automatic according to customer preferences. The different component variants were pro-
duced by means of the optional integration of a local reinforcing insert, the variation of the structural thickness by means of the thermo-
plastic foam injection molding and the injec-
tion volume. Due to an overlapping network of the system components via a master computer, individual access orders via an internet-capable terminal could be issued individually with corre-
"
**INTERNATIONAL COOPERATION ON INNOVATIVE WINDING TECHNIQUE**

The Installation of the Innovative and Economic Production Technology “MFW-48” Made Progress in January

Murata Machinery Ltd., Japan, producer of advanced and innovative textile technology, is introducing the new Multi Filament Winding (MFW) technology MFW-48 to the market.

To establish MFW as innovative and economic production technology for composite structures in the German and European market, Murata and Institut für Textiltechnik der RWTH Aachen (ITA), one of the biggest textile institutes in Germany, started collaboration. The installation work of the machine MFW-48 at ITA commenced in January 2017.

The new technology MFW-48 has the capability to process 48 fibres simultaneously. It offers the potential to produce structures for composite applications with outstanding mechanical properties in a highly productive way. A mandrel rotates and moves back and forth horizontally, while the reinforcing fibres, e.g., carbon, are positioned on the mandrel successively. These tubular parts are characterised by a unidirectional and non-creimped structure to increase mechanical properties in fibre direction. During the rotation, a complete layer is placed down on the mandrel at the same time. The outcome of this is that the machinery allows short manufacturing times, high economic efficiency and increased productivity of producing process. With these characteristics, MFW-48 meets the requirements for series production.

The next step will be the evaluation of technical characteristics of the MFW process and composite to open up new ways and opportunities for prototyping and analysis of the technology for various applications. Especially, the production of lightweight pressure vessels will be taken into consideration. In automotive industry, these vessels can be used to store hydrogen and thus make an important contribution towards implementing the turnaround in energy policy and CO2 reduction.

ITA expresses its gratitude to the partner Murata Machinery Ltd. for the good collaboration and the intensive efforts on site at ITA in Aachen.

**AZL WORKGROUP: PIPES AND VESSELS**

Pipe and vessels represent an ideal application for fibre-based materials. Therefore, fibre-based materials are of growing interest for fluid transportation and storage in industries like oil, water or gas, but also for the transportation sector. Lightweight for low handling and transportation cost, non-combustible for long service life are some drivers behind that interest. The AZL Partners defined “Pipes and Vessels” to be a topic for a new workgroup meeting every six months.

So far, two workgroup meetings took place working on an Aachen Institutes Competence Matrix regarding pipes and vessels, the development of a generic pressure vessel and of a Business Platform “Composite Pipes and Vessels” which will be launched soon.

**MACHINING OF HIGH STRENGTH STEELS AND SHEAR CUTTING OF COMPOSITES**

The Fraunhofer IPT Extended its Machinery with a 200 Ton Servopress in 2016

Research projects for local heating and machining of high-strength steels for lightweight applications mainly for the automotive industry are running. Shear cutting of composite structures on a press is scheduled.

The use of high-strength steels is known as a key factor to enable cost-efficient lightweight design. With its improved properties, these steels guarantee on-site functionality and simultaneously a reduction of mass. As a matter of fact, the advantages in the application turn into difficulties during the machining process. The high strength causes quick wear of the tools. Often poor cut surface qualities occur in shear cutting processes.

These difficulties can effectively be overcome by using local heating of the high-strength sheet metal. With several years of research in local laser heating of high-strength steels, Fraunhofer IPT built up experiences and competencies in developing corresponding systems and processes for the integration of this novel approach in existing sheet metal working processes. The local laser heating softens the material temporarily and enables production processes like shear cutting and bending with clear cut surfaces of up to 100% and high degrees of deformation.

Based on the experiences with laser radiation for the heating of complex geometries, different techniques like inductive or conductive heating are currently developed at the IPT. Depending on the process parameters also local hardening is possible and load optimized properties of individual parts can be achieved in order to further reduce component weight.

The commissioning of a Schuler servopress with maximum force of 2000 kN in 2016, Fraunhofer IPT has the opportunity to operate under industrial conditions. As an application oriented research organization, Fraunhofer IPT offers research activities and the development of integrated heating systems and processes under an industrial point of view.

To withstand these velocities the winding speed has been increased from 20 m/min up to 90 m/min. The outcome of this is that the machinery meets the requirements of an industrial scale vessel manufacturing.

The technology is based on a thermoplastic prepreg material, which is heated by laser energy and consolidated by a compression roller. The so-called in-situ consolidation allows the curing of the laminate during the winding process. So no post-processing in an autoclave or hot press is necessary. The laser is a very energy efficient heat source that can be well controlled, especially at high winding speeds. The process also contains less health risks, because it avoids open resin systems and the process happens fully automated in a safety enclosure.

The new winding head was consequently designed to face the requirements of the high speed vessel winding. Most important goals have been the reliability and the productivity of the system. By optimizing the head and its handling system the maximum winding speed has been increased from 20 m/min up to 90 m/min. To withstand these velocities the tape guiding system has been completely redesigned. Also the tape tension system has been adapted to higher tape tensions, which also increases the consolidation and laminate quality.

**HIGH SPEED WINDING OF THERMOPLASTIC HIGH PRESSURE VESSELS**

The growing demand on the low carbon dioxide emitting vehicles within the automotive and transportation sector, promotes and encourages the usage of fibre like CNG or hydrogen. The composite vessel technology allows tank systems with high working pressures combined with low structural weight.

The well-known technology was hindered so far by the high material and production costs. AFPT faced the challenge to develop an innovative production technology that meets the requirements of an industrial scale vessel manufacturing.

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**LASER-ASSISTED WINDING**

Aluminium as well as composite structures and sandwich materials. The use of the press as a test bench for shear cutting of composite materials is possible. That includes the cutting of outer contour as well as shear cutting within the part. Also in the upcoming years, Fraunhofer IPT is your partner for any material- and process-based research in the field of lightweight design. At a seminar on the 4th of May, 2017, a detailed overview about industrial machining of high-strength steels and research activities in this field is going to be presented at the Fraunhofer IPT in Aachen.

Hannning Janssen | Thomas Storms
Fraunhofer Institute for Production Technology IPT | Hannning.janssen@ipt.fraunhofer.de | Thomas.storms@ipt.fraunhofer.de

**AFPT winding head for vessel manufacturing**

AFPT Developed a High-Speed Winding Head for Large Scale Composite Vessel Manufacturing.

Next Workgroup Meeting: May 30th, 2017

**Fig. 1: Engineers from Murata and ITA successfully commissioned MFW-48 ©ITA**

**Fig. 2: Multi Filament Winding Machine MFW-48-ITA**

**Fig. 3: Engineers from Murata and ITA successfully commissioned MFW-48 ©ITA**

**Schuler servopress (maximum force of 2000 kN) at Fraunhofer IPT**

Aluminium as well as composite structures and sandwich materials. The use of the press as a test bench for shear cutting of composite materials is possible. That includes the cutting of outer contour as well as shear cutting within the part. Also in the upcoming years, Fraunhofer IPT is your partner for any material- and process-based research in the field of lightweight design. At a seminar on the 4th of May, 2017, a detailed overview about industrial machining of high-strength steels and research activities in this field is going to be presented at the Fraunhofer IPT in Aachen.
The industrialization of the production of composites is still impeded by insufficient quality assurance methods. To increase the production speed and decrease scrap quota automation and an automatic adaptation of the behavior of the quality assurance system to dynamic production conditions is essential. Therefore, at the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, a new method was developed, which enables the measurement of the geometry single inspection step with contact-free infrared excitation and high-resolution infrared sensors. Ultrasonic testing is characterized by high flexibility and cost efficiency which are important factors for the realization of a quality assurance method for CFRP.

The Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University develops solutions for the automated defect detection of manufacturing errors or damage due use as delamination, fiber breakage and matrix cracks. In addition, (adhesive) bonding points and wall thicknesses can be investigated nondestructively.

Aachen – A balanced conduct of cost, quality and efficiency during every stage of the process, product and tool development surely guarantees coping with the daily challenges encountered within the market. Moldex3D is dedicated to assist part designers and mold makers to develop and produce higher quality products in form, fit and function at lower costs and reduced times-to-market. The recent release of Moldex3D already surprised the users with its numerous developments but far more novelties and groundbreaking efficiency during every stage of the process, product and tool development surely guarantees and function at lower costs and reduced times-to-market.

In addition, two applications to perform a simulation is a feature of the past. Simulations and pre-post operations are now fully automated detectable and classifiable. The system is available as a robot-based or as a multi camera set-up. For the inspection of composites parts in field use thermography and ultrasonic systems are common sensor systems. The optical lock-in thermography is an active heat flow analysis, which is well-suited for the inspection of carbon fiber reinforced plastics (CFRP). Large areas are covered in a single inspection step with contact-free infrared excited and high-resolution infrared sensors.

Ultrasonic testing is characterized by high flexibility and cost efficiency which are important factors for the realization of a quality assurance method for CFRP.

The Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University develops solutions for the automated defect detection of manufacturing errors or damage due use as delamination, fiber breakage and matrix cracks. In addition, (adhesive) bonding points and wall thicknesses can be investigated nondestructively.

Moldex3D R15 all of which can dramatically improve the speed, robustness and reliability of simulation and thus allow enterprises to get the most out of virtual simulation for injection molding and create core competences and add a substantial amount of value to their products.

Completely New Platform – Studio – One path-breaking development to look forward to is new Moldex3D Platform – Studio. The necessity to use two applications to perform a simulation is a feature of the past. Simulations and pre-post operations can now be completed in one application. A ribbon style user interface is guaranteed and high-performance rendering promises smooth and fast operations. Another great advantage is the extremely reduced file size. Furthermore, multi-run comparisons are supported as well as hot-key operations.

Designer BLM 3.0 goes to an entire new level – The new versions of Moldex3D R15 will take the Boundary Layer Mesh (BLM) generator to a completely new level. BLM 3.0 will not only allow using fewer meshing elements which dramatically reduces the meshing time whilst keeping up the maximum wall thickness resolution but will also enable extraordinary possibilities in terms of advanced meshing and flexibility. Furthermore, the capabilities and options of non-meshing technology have been extended, optimized and intensively modified. More components such as coolant channel, heating rod, mold insert, and mold base are supported. This makes the solid mold base mesh preparation job a lot easier and cuts down meshing hours significantly and temperature results show a smooth outcome. BLM 3.0 thus revolutionizes your simulation to a whole new, highest possible level of efficiency and performance.

As a leading manufacturer of carbon fibre and composite materials Hexcel is promoting a number of composite innovations for aerospace, wind energy, automotive and recreation industries at JEC World 2017.

Aerospace promotions include advances in HiTape® carbon fibre reinforcements for the automated lay-up of preforms for aircraft structures that are manufactured out of autoclave by resin infusion.

Hexcel’s automotive technologies promotions include a suspension knuckle made by St Jean Industries in which the aluminium structure is stiffened with HexPly® M77 prepreg stacks, resulting in a 26% increase in stiffness compared to the aluminium-only knuckle, without any increase in part volume. The prepreg stacks are bonded to the aluminium with Redux® 677, Hexcel’s new fast curing film adhesive for the high volume processing of metal/CFRP hybrid structures.

Hexcel will also display a composite floor demonstrator manufactured for Jaguar Land Rover using HiMax® carbon fibre multiaxial fabrics. Hexcel created a non-crimp fabric with the optimum balance between draping, stability and permeability using an automotive-grade standard modakix, high tow count carbon fibre.

Polyspeed® Pultruded Carbon Profiles are new technology from Hexcel for pre-cured, thick- ply carbon fiber elements, offering an economical way of structurally reinforcing wind turbine blades. Carbon fiber tows are impregnated with a thermoset resin and shaped and cured in a continuous pultrusion process, resulting in perfect fiber alignment and a smooth surface. Pultrusion is a cost-effective solution for achieving standardised geometries in high volume production. Hexcel’s displays at JEC include a 2 meter diameter carbon laminate coil made from Polyspeed® carbon fiber pultrusion for the structural reinforcement of a wind turbine blade.
AZL CONNECTING RESEARCH AND INDUSTRY FOR LIGHTWEIGHT PRODUCTION

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 solidifies the lightweight expertise of eight partner institutes with 750 scientists on the RWTH Aachen Campus. The AZL builds an international partner network between these institutes and more than 80 international companies involved in lightweight production. For this, AZL consists of two separate entities: The AZL of RWTH Aachen University addresses the transformation of lightweight design in mass production with basic research and development of lightweight products, materials, production processes and systems with access to the latest full-scale machines and automation systems. As a service provider partnering with companies in the field of lightweight production technology, AZL Aachen GmbH provides industrial services in the areas of engineering, consultancy and project management, networking and business development. Together as AZL, we are the one-stop shop for lightweight production technology and offer holistic and cross-industry solutions. With the AZL Partnership, the AZL Aachen GmbH enables the close cooperation between the lightweight industry and the research institutes of RWTH Aachen Campus along the whole value chain.

OFFICES FOR AZL PARTNERS IN NEW PRODUCTION ENGINEERING CLUSTER

Lightweight Experts Working Shoulder to Shoulder at the RWTH Aachen Campus

With co-working spaces and exclusive offices in the new Production Engineering Cluster, AZL is bringing together its industrial and research partners within the heart of Europe’s largest research landscape for production technology. By working shoulder to shoulder, AZL Partner Companies keep their finger on the pulse of new technologies and are in direct contact to experienced industrial and scientific lightweight players. Besides having an inspiring presence to bring their employees and their customers, companies can connect their R&D to the high-tech environment and make use of the nearly unlimited equipment and hardware of RWTH Aachen. The packages include fully equipped co-working spaces for AZL Business Partners and one exclusive office room with complete infrastructure for two employees for each AZL Premium Partner. Meeting rooms as well as a communication zone are available. Your Contact: Marina Biller | marina.biller@azl-aachen-gmbh.de

AZL @ JEC WORLD

At JEC World 2017, the AZL Partner Institutes present their latest research at the special exhibition zone “Composites in Action”. On March 15th, JEC Group and AZL organize a conference on “Production Technology for Multi-Material Lightweight Components” and guided tours to booths of AZL Partner Companies. Since 2015, AZL and JEC Group cooperate with the aim of jointly promoting developments and insights regarding integrative lightweight production technology. AZL @ JEC World 2017: Hall 6 | C79

YOUR DIRECT AZL CONTACT

Marina Biller
AZL Aachen GmbH | Head of Partner Network Services
marina.biller@azl-aachen-gmbh.de
+49 241 8904 - 380

Find more details on lightweight-production.com or the login.azl-aachen-gmbh.com

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September 14 - 15
B2B NETWORKING EVENT AT IAA FRANKFURT
Keynote Presentations | Networking Dinner | Guided Visits to Company Booths

September 26
HIGH-SPEED RTM MATRICES
Workgroup Meeting

October 10
HYBRID THERMOPLASTIC COMPOSITES
Workgroup Meeting

October 12 - 13
JOINT BUSINESS DEVELOPMENT TRIP TO POLAND
B2B Meetings at Kompozyt Expo 2017 | Guided Visits to Polish Composite Companies

November 15
HIGH-PERFORMANCE SMC
Workgroup Meeting

November 23
PIPS & VESSELS
Workgroup Meeting

UPCOMING AZL MEETINGS

April 25
AZL OPEN DAY
Guided Tours to 9 AZL Research Labs

May 30 - 31
PIPS & VESSELS | HIGH-PERFORMANCE SMC
Workgroup Meetings

June 21 - 22
AZL ANNUAL PARTNER MEETING 2017
Discuss the Activities of the Last 12 Months and Define Future Topics and Projects with us!

News Letter #8/2017
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