"Flexible Multi-Material-Use across the entire process chain" is the focus topic of AUTOMOTIVE ENGINEERING EXPO 2015. And these 70 suppliers present their top issues at the world’s only trade fair for car body manufacturing, painting and assembly.

More AEE highlights are:

» During AUTOMOTIVE ENGINEERING EXPO showcase, the best car body concepts of EuroCarBody can be inspected by a wider audience.

» Guided tours through the exhibition area take you directly to the right answers and solutions of suppliers.

» The Innovation Alley runs like a thread through the entire exhibition area of the AUTOMOTIVE ENGINEERING EXPO. Here, exhibitors present their latest products and services – nominated by the International OEM Advisory Board.

Lightweight construction with bionic load-bearing structure and outdoor fabric as a skin

“Light Cocoon” is the name of the 16th concept car by the engineers of specialists EDAG Engineering GmbH (EDAG). It shows what can become possible with biomech design and addition manufacturing and presents a completely new aesthetic in automotive design. At the same time the “Light Cocoon” defines requirements for the manufacturing processes and components. It becomes obvious how the networking of product and production development is now and will be in the future. Therefore, the decades of expertise that EDAG Production Solutions GmbH & Co. KG (EDAG PS) has worked on in addition manufacturing is now a decisive advantage for this production development of the cars of today and tomorrow. Park boxes, which only have material where they need it for function, safety and stiffness, serves as a source of ideas and a model for the development of the “Light Cocoon” with its stable, branch-like load bearing structure. The result is a panel down structure resembling a spider’s web which provides a construct made from aluminum profiles of varying dimensions. In order to quantify and verify the lightweight construction potential of this biomecanically designed structure, EDAG applied this approach to the design of a hood for a production vehicle, as an example, and then calculated it. The calculation results not only confirmed the stability requirements but also revealed a weight saving of about 35% from the hood. For the implementation of this visionary concept, EDAG has set up a partnership with outdoor clothing specialists Jack Wolfskin and protects the “Light Cocoon” with the extremely lightweight outdoor fabric “Snapope® Softshell 02+.” The flexible, organic structure, which is made visible by LED lighting technology installed behind the fabric outer air and will perfectly showcase the independent, innovative look at the AUTOMOTIVE ENGINEERING EXPO.

Multi-material construction: Prototypes demonstrate increase in performance at reduced weight

A front-end in multi-material construction is among the visions that KIRCHHOFF Automobile is pursuing at the AUTOMOTIVE ENGINEERING EXPO. It was created as part of a pre-development project which investigates, among other things, the suitability of continuous-fiber-reinforced thermoplastics in combination with other materials. The innovative component consists of a material combination of steel, organic sheet and glass-mat-reinforced thermoplastics (GMT). Each material has been used in such a way that it makes the most of the advantages of its material-specific properties. The components of organic sheet, for example, are used such that the loads mainly occur only in those areas. Thus, it is possible to achieve a uni-directional fiber alignment and maximum material utilization.

The integrally molded rib of GMT provides additional stiffening. This plate material is heated simultaneously with organic sheet blanks, inserted into the forming tool and merged. Along with the forming rib, it is thus possible to create a partial wall thickness increase for stress reduction. Another advantage: the cut edges of the organic sheet are welded and are protected against environmental influences and delamination.

The weight saving for these components alone is over 10% and is achieved using relatively inexpensive plastic fibre. Alexander Günther, Product Development at KIRCHHOFF Automobile, states, “Integrally molded parts demonstrate an increase in performance at significantly reduced weight. This project thus highlights the relevance of multi-material construction for future developments.”

Looking into the future of automotive development and production

“Our focus is networked engineering,” explains Rainer Wittich, CEO, EDAG Production Solutions GmbH (EDAG PS). The company plans complete solutions for all fields, including core processes, and provides single-source support throughout the realization stage. At the AUTOMOTIVE ENGINEERING EXPO, EDAG PS will showcase its skills impressively with the "Flangeless”，“Genesis” and “Light Cocoon” exhibits. "Flangeless" represents sustainable and energy-efficient future construction, which is characterized by high mass of standard parts over several project cycles, a low level of vertical integration, use of the latest manufacturing processes and recycling of non-reusable parts. "Genesis" is a vehicle sculpture based on the bionic patterns of a turtle. The basic design study shows the new freedoms opening up to designers and design engineers as a result of additive manufacturing processes, such as producing in a single manufacturing process, which 3D printing can already offer today. Rainer Wittich reports, “As a result, this makes it possible to come to a big step closer to the design principles and strategies of nature. Everything is developed for a purpose and evolved into optimized structures. And it is achieved tool-free, resource-efficiently and ecologically. "Light Cocoon" is the evolution of the "Genesis". It is body has stable, branch-like load bearing structure which only provides material where it is actually needed. EDAG PS is a Mecca of ideas for designers and design engineers and shows what is already possible in the here and now and how this could be developed further.”

Dr. Rüdiger Brockmann, Head of Sector and Product Management at TRUMPF Laser- und Systemtechnik, says, “With an innovative laser system it is possible to manufacture complex parts in one melt on the workpiece. In one operation, all processing steps are performed simultaneously in a process known as laser forming. This process has similarities to press hardening of metal parts. In contrast to press hardening, however, laser forming opens up a previously unimagined field of application and offers almost endless freedom for the design of car bodies and the use of new materials. Laser forming is not only suitable for low-volume production, but also for high-volume production.”

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Home of lightweight design: Simplifying workflows and reducing weight

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The development and launch of the new electric car model i3 (McLaren’s-era vehicle) and the BMW i8 sportscar, has established BMW’s leading edge in the industrial application of CFRP in structural car body parts. In his plenary presentation, Dr. Patrick Kim will provide an overview with a focus on what has been learned from the development and production of the first series cars, and how these lessons have been carried over also to the more conventional BMW models, for instance to the flagship of the group, the new BMW 7 Series.”

Hot forming of aluminium in multi-material construction of light and complex shaped high strength car body parts

Tightened CO2 regulations lead to an increasing trend of using different aluminium alloys in the car body and other components to save weight. To be able to form complex shaped parts, to decrease spring back and to increase the material availability of the formed part, aluminium hot forming seems to be a suitable solution. Since the process is energy-intensive, the process temperature of the barrel skin, it is interesting to see what needs to be done in order to make this technique applicable for the press shop. In this presentation, AP&T shows an example of how to set up an aluminium hot forming production line and how energy efficient.

Flangeless joining technology: Simplifying workflows and reducing weight

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5 questions to Dr. Thomas Rudlaff

1. The OEM advisory board has preceded the Automotive Engineering Expo 2015 with the focus topic “Flexible use of multi-materials throughout the process chain”. From your company’s point of view, what are the greatest challenges at present to the body construction process chain?

2. How are the developments in lightweight automotive construction changing overall vehicle concepts?

3. What are your expectations of the suppliers of lightweight construction solutions?

4. Here, it’s a matter of creating entire process chains and solutions from individual building blocks. To do this, it may be necessary to link or even extend each existing range of topics, possibly by means of cooperation.

5. We increasingly need suppliers who are familiar with combined manufacturing and joining technology, supported by functional simulation and interpretation of the relevant results. We will continue in future to ask for assemblies that continue in future to ask for assemblies that are designed to be more fully functional.

“It may be necessary to link or even extend existing range of topics”

Lightweight construction is one of the most important driving forces in automotive engineering. CFRPs with their mainly thermostetting matrix are experiencing unprecedented hype but, due to high material and processing costs, they are used mostly in the high-end segments. Organic sheets, which are woven or laid fabrics impregnated with a thermoplastic matrix, have a very high potential for lightweight construction at an acceptable price. Their advantage lies in low-cost processing and good recycling opportunities as a result of the recyclability of thermoplastics. Fiber-glass fabrics also have excellent strength and stiffness properties. Michael Hibben, Manager Product Development, reveals, “Stadco is working on a crash box made from organic sheet.” As proven by simulations and real crash tests, the energy absorption is excellent and better than that of metals. It’s also possible to achieve 30 to 60% savings in weight compared to aluminum or steel. As with all fiber-reinforced composites, however, the disadvantage is the poorer structural integrity of the components under highly dynamic loads. The aim is to secure this integrity with a new approach. Stadco is working on introducing thin steel fiber laid or woven fabrics into the organic sheet. At the AUTOMOTIVE ENGINEERING EXPO, the company will present the results of the crashbox development – which took first place at the AVK Innovation Awards in the products/applications category – and the effect of steel fibers on component behavior.

Another highlight at the exhibition will be B-pillar reinforcement using a bionic approach. By using a bionically inspired reinforcement (inlay), Stadco has managed to reduce the overall weight by up to 35% while crash performance remains the same.

Reducing weight with innovative adhesives

The use of high-strength steels, light metal alloys and innovative multi-material structures will help to reduce weight in the car bodies of the future. They are based on appropriate joining technologies for which the chemical company Sika develops customized solutions. The company will introduce other innovations for saving weight at the AUTOMOTIVE ENGINEERING EXPO: “Ultra High Modulus 1-K-PUR” for structural and crash-resistant bonding of different materials (e.g. CFRP/ aluminum) and “Ultra-Low-E-Modul 1-K-PUR” for stiffening and damping of vehicle roofs. A high-performance adhesive is another innovation. According to the company, it enables a weight saving of 20 kg per vehicle, meets the highest safety requirements and is already being used in the e-Golf.

Sika is showcasing a high-performance adhesive which enables weight savings of 20 kg per vehicle and is used in the e-Golf.

AT A GLANCE

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Opening hours: 9 - 10 June 2015, 9 a.m - 6 p.m.
Fair tickets, incl. 19% VAT
Day ticket: 18,- EUR, season ticket: 35,- EUR
Save tickets now!

Hall 7A, booth 315
Stadco Saarlouis, Saarlouis, Michael Hibben, Tel. +49 6831 8952-300, m.hibben@online.de, www.stadco.de

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Source: Stadco

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