
Editorial

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Biographical note: Christian Lauter collected an academic background in Mechanical and Industrial Engineering at the Paderborn University. Afterwards, he worked as a Scientific Assistant and later as a Senior Research Scientist at the Chair for Automotive Lightweight Design at the Paderborn University for 8 years, where he also obtained a doctoral degree in 2014. His fields of research involved the characterisation, development and manufacturing of fibre-reinforced plastic and hybrid structures. He has published his research in journals, conference proceedings and books. In addition, he managed a graduate school with emphasis on lightweight design for 2 years. In 2016, he moved to the industrial sector. At Carbon Rotec Composite Technology, he is responsible for the process development and several research and development activities. Currently, his focus is on wind energy, (commercial) vehicle and infrastructure applications, i.e. bridges.

Automotive manufacturers have to fulfil a wide range of requirements. On the one hand, governmental regulations, e.g. recycling rates or emission standards, have an influence on the future product strategies. On the other hand, customer demands, e.g. safety, comfort or driving characteristics, should be observed in order to place a successful product on the market. In this field of tension, the different approaches of automotive lightweight design became more and more important in recent years. Automotive suppliers and manufacturers focused on metal materials with improved mechanical performance. Here, new materials such as high-strength aluminium alloys or new processes such as the hot forming of manganese-boron steels were developed. For premium or motorsport applications also, composite materials are used. But, for large-scale products, the high lightweight potentials have been overcompensated by high material and production costs for most fields of application.

At this point, combinations of different materials could be identified as a promising approach for an optimised lightweight design. The combination can be realised on a component level, where structures made of different materials are combined by adequate bonding technologies. Hybrid structures are characterised by a combination of different materials on a material level, i.e. at least one component is available as a semi-finished

product just before the final production stage. Examples for hybrid systems can be found in the prepreg-press-technology or the forming of organic sheets, when composite materials are directly formed into a sheet metal structure. Other hybrid processes are intrinsic manufacturing processes. Here, the combination of different materials is realised in a single production step.

The combination of different materials with varying characteristics is a challenging approach. This affects the product development process, the simulation and optimisation of materials and products by numerical methods, the manufacturing processes and the testing of material systems and components. The available special issue of the *International Journal of Automotive Composites* aims on these challenges that are a result of the combination of materials with different characteristics, behaviours and processing properties. This edition tries to find answers and solutions in order to give researches, scientists and engineers an extensive technical guidance.

This special issue starts with the application of data mining in order to accelerate product launches for FRP-based components. Subsequently, the content of the papers switch towards the manufacturing and modelling of hybrid structures consisting of sheet metal and FRP. The performance of a hybrid construction is at least a result of the bond strength between the single components. Thus, this topic is addressed in the following papers. Main topics are adhesive bonding technologies but also the influences of different surface pretreatments or mechanical joining elements. The available special issue ends with a view on the component level and the behaviour of an aluminium-CFRP structure under crash loads.

Finally, the guest editor of this special issue wish to thank the authors for their efforts to realise their high-quality contributions for this edition of the *International Journal of Automotive Composites*. Aside, a sincere thank goes to the reviewers of the articles, who build the basis for the high quality of the final versions of the papers. Moreover, the guest editor would like to gratefully acknowledge the opportunity to organise this edition, the support and the advice of the Editor-in-Chief, Professor Ahmed Elmarakbi, and the people behind Inderscience Publishers as well as the publishing house of Inderscience.