

P R E S S R E L E A S E

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AVK Innovation Award 2020

The AVK – Industrievereinigung Verstärkte Kunststoffe – presents its awards virtually for the first time

Frankfurt: The AVK – Industrievereinigung Verstärkte Kunststoffe e.V. – has once again announced the winners of its prestigious Innovation Awards. Decided by an expert jury, the awards recognise and honour sustainable innovations in three categories: “Innovative Products/Applications”, “Innovative Processes” and “Research and Science”.

“We were delighted to receive so many strong submissions again in 2020. Many aspects of the process were, of course, rather different this year. For the first time, the award ceremony was held as an Internet event. However, it is clear that everyone – everywhere – is making the best of the situation. The positive trends in the field of fibre-reinforced plastics are still continuing. We expect these important materials to be at the heart of many innovations in the coming years,” says Gerhard Lettl, chairman of the jury.

Category “Innovative Products/Applications

First place in the category “Innovative Products/Applications” was awarded to “Directly-cooled electric motor with integral lightweight housing made of fibre reinforced polymers - DEmiL” developed by the Fraunhofer Institute for Chemical Technology ICT, Pfinztal, Germany, in partnership with the Karlsruhe Institute of Technology and Sumitomo Bakelite Co., Ltd. This high-performance electric motor proves that fibre reinforced plastics can be used to produce smaller and lighter structures than standard metal designs. The motor achieves a continuous output of 58 kW at a weight of just 10.5 kg. The power density of 5.5 kW/kg sets a new

standard for electric motors that can be produced in large series. A cooling system was integrated into the housing, which dissipates the heat generated by the motor directly at source and makes it possible for composites to be used in the construction.

Second place was awarded to cidetec from Donostia-San Sebastian in Spain for its “Intrinsically Reprocessable, Repairable and Recyclable (3R) thermoset composites for more Competitive and Sustainable Industries”. These use dynamic and covalent bonding to create a new generation of thermoset composites which, alongside the familiar performance characteristics, have other properties never seen before in this form. They can be easily reconditioned, recycled or repaired.

Third place was awarded to a “fireproof composite metal hybrid structure - LEO® fire protection sandwich with integrated Hyconnect steel-glass hybrid connector” from SAERTEX GmbH & Co. KG and Hyconnect GmbH. This is a 3D-reinforced composite sandwich structure, into which fire protection layers can be inserted to insulate and cool in case of fire. Standard epoxy resins can be used during vacuum infusion to integrate a hybrid glass-metal structure – to which traditional metal components can be attached by welding, providing a fireproof connection at an early stage of the process. This fire protective covering forms an insulating layer in case of fire and also protects the sandwich component and the hybrid connection. In contrast to traditional metal composites, this product can reduce weight by up to 55 percent.

Category “Innovative Processes”

First place in the “Innovative Processes” category was awarded to ROBIN and the Institute for Lightweight Engineering and Polymer Technology at the TU Dresden for their “Robotised Injection Moulding (ROBIN)” process. By using carbon fibre in a composite C-frame of an injection moulding machine, the developers were able to build a machine that weighs less than 140 kg. This allows the machine to be attached to a robot, for example, and moved around freely in a room. Improving the mobility of plant technology generates greater flexibility in the injection moulding process for the production of hybrid components, while simultaneously

making it possible to manufacture lightweight products in a manner that saves resources.

Second place was awarded to the “Omega stringer from the roll” developed by the German Aerospace Center. This new manufacturing process allows omega-shaped stiffening elements to be produced from carbon fibre epoxy resin prepregs. It enables manufacturers to produce stringers efficiently at low cost and in large quantities while also saving resources. The process chain as a whole combines automated fibre placement (AFP) technology, single-sided membrane forming, also known as hot forming, and autoclave curing. The special feature of the novel production process is the simultaneous forming of cross-sections with positive and negative curvatures.

Third place was awarded to “Hybrid die-casting – manufacturing of intrinsic CFRP-aluminium composite structures in aluminium high-pressure die-casting” – a process developed by the Faserinstitut Bremen (FIBRE) and Fraunhofer IFAM. This new process provides a technique for joining aluminium alloys and carbon fibre reinforced plastics by melting the thermoplastic layer. At the same time, the thermoplastic layer creates an electrochemical separation between the carbon fibre and the aluminium alloy, preventing contact corrosion. The strength is achieved in the interface between the thermoplastic layer and the aluminium. The process saves resources and can be used in series production. Due to its potential in lightweight construction, it could reduce CO₂ emissions from vehicles.

Category “Research and Science”

In the category “Research and Science”, first place was awarded to Münster University of Applied Sciences for its “New high-temperature resistant UP resins and toughening agents”. The UP resin achieves a maximum glass transition temperature of almost 250 °C. The highest previously measured heat distortion temperature is around 180°C. The photochemical and thermal reactivity is significantly higher than that of comparable high-temperature resistant vinyl esters and urethanes. The toughening agents are based on styrene-maleic anhydride copolymers and increase the viscosity of the resin at temperatures between 100

and 160 °C. At the same time, they increase reactivity and improve the surface quality of the laminate.

Fraunhofer Institute for Chemical Technology ICT was awarded second place for its “Scientific principles for the industrial application of the thermoplastic resin transfer moulding (T-RTM) process”. This research project evaluates the negative effects of moisture in T-RTM. The process compensates for water in order to restore the prior reaction speed with almost identical polymer properties. With a newly developed simulation model, the process can be controlled specifically by modelling the process kinetics. This leads to a highly efficient process and enables T-RTM components to be manufactured in series production environments.

Third place was awarded to the Institute of Polymer Technology at the University of Erlangen for its project “Material- and energy-efficient production of turbine struts by the integrative combination of thermoset fibre reinforced materials”. The “Duro-IMF process”, which was developed in the course of the research project, enables complex thermoset fibre composite components to be manufactured efficiently by thermoset injection moulding. The process combines continuous fibre reinforced prepregs and short fibre reinforced moulding materials in the one-shot principle. By coordinating the material modification and intelligent process controls, the resin systems of the materials react irreversibly with each other during curing in the mould, resulting in a hybrid component with high bonding strength, low weight and high temperature resistance, as well as a reduction in energy consumption and cycle time of over 50 percent.

Overview of all the winners in the three categories:

Category “Innovative Products/Applications”

1st Place: “Directly-cooled electric motor with integral lightweight housing made of fibre reinforced polymers - DEmiL” – developed by the Fraunhofer Institute for Chemical Technology ICT, Pfinztal, Germany, in partnership with the Karlsruhe Institute of Technology and Sumitomo Bakelite Co., Ltd.

2nd Place: “Intrinsically Reprocessable, Repairable and Recyclable (3R) thermoset composites for more Competitive and Sustainable Industries” – developed by cidetec, Donostia-San Sebastian, Spain

3rd Place: “Fireproof composite metal hybrid structure – LEO® fire protection sandwich with integrated Hyconnect steel-glass hybrid connector” – developed by SAERTEX GmbH & Co. KG and Hyconnect GmbH.

Category “Innovative Processes”

1st Place: “Robotised Injection Moulding (ROBIN)” – developed by Robin, Dresden with the Institute for Lightweight Engineering and Polymer Technology at the TU Dresden

2nd Place: “Omega stringer from the roll” – developed by the German Aerospace Center, Braunschweig

3rd Place: “Hybrid die-casting – manufacturing of intrinsic CFRP-aluminium composite structures in aluminium high-pressure die-casting” – developed by Faserinstitut Bremen e. V. with Fraunhofer IFAM, Bremen

Category “Research and Science”:

1st Place: “New high-temperature resistant UP resins and toughening agents” – developed by Münster University of Applied Sciences with BASF SE Global New Business Development, Leibniz Institute for Polymer Research e. V., Saertex multicom GmbH

2nd Place: “Scientific basis for the industrial application of the thermoplastic resin transfer moulding (T-RTM) process” – developed by Fraunhofer Institute for Chemical Technology ICT, Pfinztal

3rd Place: “The material- and energy-efficient production of turbine struts by the integrative combination of thermoset fibre reinforced materials” – developed by the Institute of Polymer Technology, University of Erlangen-Nuremberg with the German Aerospace Center, Gubesch Group, Schmidt WFT, Siebenwurst, Raschig.

Award ceremony on the Internet for the first time

For the first time, due to the Covid-19 pandemic, the award ceremony took place as an online event on 12 November 2020. Many of the award winners' innovations will be presented again in this year's AVK Innovation Award brochure. This will be available online.

<https://www.avk-tv.de/innovationaward.php>

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About AVK

AVK, the German Federation of Reinforced Plastics, is the professional German association for fibre-reinforced plastics and composites. It represents the interests of manufacturers and processors both in Germany and at the European level.

Its range of services includes specialised workgroups, seminars and conferences as well as the provision of market-specific information (www.avk-tv.de).

In Germany, AVK is one of four support organisations of GKV, the General Association of the Plastics Processing Industry. Within Europe, it is a member of the European umbrella association for composites, EuCIA (European Composites Industry Association).

AVK is a founding member of Composites Germany.