

Stuttgart, 16th April 2018

PRESS RELEASE

ThinKing April 2018 – Wound up tight: FibR GmbH creates revolutionary buildings out of fiber composite parts and looking to nature for inspiration

Thanks to computer aided designs and robotic manufacturing technology, new construction and design techniques are making revolutionary ideas a reality.

Complex composite parts which are not only light and stable, but also visually appealing – that is the mission of FibR GmbH from Stuttgart. The company combines the classic areas of design, construction and manufacturing in a one stop shop, primarily in the service of architectural projects. One such project is a pavilion crafted out of fiber composite materials being built for next year’s federal horticulture show (“Bundesgartenschau”) in Heilbronn. The prototype of one of the company’s another projects has the potential to clean up the air in busy cities.

The State Agency for Lightweighting Baden-Württemberg is presenting this innovation as its ThinKing for April 2018. Leichtbau BW GmbH awards this distinction each month to offer a platform to innovative products and services in the Baden-Württemberg lightweighting sector.



FibR GmbH is specialized in computer based design and the robotic manufacturing of fiber composite structures. One of the larger projects which the team of the Stuttgart based company is involved in is the futuristic pavilion to be built for the federal horticulture show in Heilbronn next year. The lightweight construction is crafted out of carbon fibers and consists of 60 individual modules that are each up to six meters

long. “The fiber composite dome will span 30 meters. Each of the 60 modules is precisely designed according to its structural and architectural purpose,” says Moritz Dörstelmann, managing director of FibR GmbH. The project team responsible for the experimental pavilion also includes the Institute for Computational Design and Construction (ICD) and the Institute of Building Structures and Structural Design (ITKE) at the University of Stuttgart.

Improving urban climate

Not only appearance, but also functionality plays a leading role at FibR GmbH. Moritz Dörstelmann unveiled the experimental design project “URBAN CLIMATE CANOPY” at the Luminale light festival last March in Frankfurt which he had led during his residency as a visiting professor at the Technical University of Munich. The lightweight construction is an architectural prototype which intends to show how the microclimate in cities can be improved through green design. The structure is covered with moss and vines meant to filter fine particulates out of the air and provide shade. “The light design was also important. By integrating glass fibers, we can create artificial lighting schemes at night and use sunlight to create great lighting effects,” explains Dörstelmann. The innovative





lightweight structures of FibR are not only useful in architectural applications. For Covestro's exhibition display at this year's JEC, the team at FibR GmbH created a carbon fiber table. "The unique design and surface effects were created using the programmed instructions that we gave to the robots as input. This allowed us to explore a completely new design model," notes Dörstelmann.

Taking inspiration from nature

"Some in the construction industry may shake their heads and say that you can either be a designer, planner or component manufacturer," says Moritz Dörstelmann. FibR unites all of these areas of expertise under one roof. "We blur the boundaries between design, construction and manufacturing. We offer our customers services in all of these areas as well as in the interfaces between them and benefit from the large number of architects in our team," says Dörstelmann. Nature is often looked to for inspiration for the designs and constructions. "All load bearing structures in nature are based on complex assemblies of fiber composite materials such as collagen fibers. We transfer this biological construction principle to the technological production of our components in order to achieve the best material efficiency," explains Moritz Dörstelmann.

In order to deal with this level of complexity, the team at FibR GmbH looks to computational design for its parts. Starting with a steel frame, a few coiling points are identified and installed. Then a computer calculates how the material can be best attached in order to create the ideal load distributing structure and at the same time use as little material as possible. "We are constantly monitoring the cost structure as well as the load bearing capacity of the separate parts – you don't get very far in construction with extremely precise but very expensive aerospace parts," notes Dörstelmann.

Resource efficiency from two sides

The second step – the actual construction of the components – is made possible by FibR's state of the art KUKA industrial robots that wrap resin soaked fibers around the frame following prior simulations and calculations. The complementary tensile forces ensure greater stability in the final product. "In the end we have a composite material which has excellent stiffness and rigidity and at the same time is extremely light," says Dörstelmann. Not only the individual components are characterized by efficient use of materials. The steel frame can be removed after the resin hardens and used to create additional products. "We therefore have a nearly completely waste free manufacturing process since we can do without the usual mold required for composite fiber products," notes Dörstelmann. In his six years as a researcher and instructor at the Institute for Computational Design and Construction (ICD) at the University of Stuttgart, Dörstelmann helped to develop a long series of demonstrations which show the architectural potential of new fiber composite lightweight structures. His experiences from this period can be seen in the work he now does for FibR GmbH. "Thanks to our scalable production line, we can carry out the production of both individual components and large series as well. In order to stay up to date, we continually expand our abilities through our own development as well as through cooperation with universities which allows us to react to the requirements of specific projects," explains Moritz Dörstelmann.

Read more at: www.fibr.tech

Conference “Lightweighting in Urban Systems”

Climate change and exploding populations, migrations, the reversal of the age pyramid and resource scarcity – what impact can lightweighting have on the cities of the future and how will cities change over the coming years? The conference “Lightweighting in Urban Systems” (18th July) presented by Leichtbau BW in cooperation with ILEK at the University of Stuttgart will examine the newest trends, concepts and developments in construction and research. The various concepts to be examined at the conference range from innovative urban planning concepts, adaptive supporting structures and facades to new building processes and materials for the construction of the future. More information will be available soon under www.leichtbau-bw.de/lus18.

Images



BUGA_Faserpavillon.jpg:

Wide spanning transparency and lightness – interior view of the lightweight structure contracted to FibR GmbH for the 2019 federal horticulture show in Heilbronn. Source: ICD/ITKE University of Stuttgart. Reprint free of charge.

Canopy.jpg:

Composite structure made of modular lightweight components with climate active vegetation: the Micro Climate Canopy created by Technical University of Munich in cooperation with FibR GmbH. Source: TUM/FibR GmbH. Reprint free of charge.



Messemöbel_Covestro.jpg:



Light and expressive: FibR GmbH crafted this table out of carbon fibers for the exhibition stand of Covestro AG at the JEC 2018 in Paris. Source: FibR GmbH. Reprint free of charge.

Portrait_Moritz_Doerstelmann.jpg:

Moritz Dörstelmann is the managing director of FibR GmbH. He completed his degree in architecture at the RWTH Aachen and the University of Applied Arts Vienna. He began teaching at the Technical University of Munich in 2017. During a six year residency at the Institute for Computational Design and Construction (ICD) at the University of Stuttgart he created a series of experimental structures which show the constructional and architectural potential of innovative lightweighting structures using fiber composite materials. Source: FibR GmbH. Reprint free of charge.



Editorial contact:

Development Agency for Lightweighting Baden-Wuerttemberg
PR Manager
Alexander Hauber
Breitscheidstraße 4
70174 Stuttgart
Phone: +49 711 – 128 988-47
Mobile: +49 151 – 1171 10 02
alexander.hauber@leichtbau-bw.de
www.leichtbau-bw.de/en