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LIGHTWEIGHT AUTO-BODY MADE OF PLANT FIBRES

Pioneering and sustainable

AUTOMOTIVE FUTURE WITH BIO-COMPOSITE MATERIALS

Tested in the world's fastest test laboratory



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The “Flying Rapper”

Sustainable mobility is no pipedream for musician and racing driver **Smudo**. Since 2003, he has competed in long-distance races in the VLN series and the 24-hour race on the legendary Nürburgring-Northern Loop for ex-DTM pilot Thomas von Löwis of Menar's **Four Motors** motorsport team. Four Motors consistently focuses on sustainability in motor

sports with its “**Bioconcept-Car**” project, integrating biofuels and biomaterials based on renewable raw materials, along with recycled oils. Smudo and Four Motors are currently driving racing cars from Porsche, which actively supports a sustainability-oriented approach, especially for lightweight construction.

Lightweight plant-fibre chassis

Lighter than glass fibres, **cheaper** than carbon fibres and made from renewable raw materials: Plant fibre components of bio-composite materials are a sustainable alternative for lightweight vehicle bodies. In addition, they have already proven their worth under the extreme-load conditions in motor sports. Above all, their low weight makes these materials attractive for the automotive industry, as they ensure low fuel consumption and thus improved CO₂ values in combustion engines. The lightweight components ensure longer ranges for electric motors. This weight-saving is inexpensive, as plant fibres are significantly cheaper than carbon fibres.

Naturally sustainable

Natural fibres like flax are as **light** as the carbon fibres widely used in both motor racing as well as standard construction nowadays. Their natural structure offers improved damping and acoustics. In addition, they boast a **better CO₂ balance** than carbon fibres as **less energy** is consumed in their production. When it comes to thermal recycling, composite materials made of natural fibres are virtually residue-free.

“Bioconcept-Car” Research Project

The German Federal Ministry of Food and Agriculture (**BMEL**) is currently funding a three-year project that focuses on sustainable weight reduction in the truest sense of the term. Smudo and Four Motors' “Bioconcept-Car” project plays a central role. It is used in testing of the lightweight components developed and manufactured by the **HOFZET® Application Center for Wood Fiber Research at Fraunhofer WKI and Porsche Motorsport**.

One striking hallmark of this research project is that bio-based car parts are tested under high-performance, extreme racing condition to assess viability for series production. This combination of motor sports and sustainability demonstrates how technical progress becomes feasible thanks to renewable raw materials.

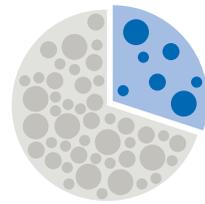
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BIOCOMPOSITES: THE ADVANTAGES



Low density



Low material costs

Positive splintering behaviour under crash load



Good acoustic damping characteristics

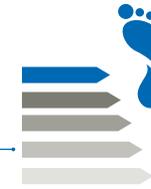


Easy to use



Virtually CO₂-neutral and residue-free thermal recycling

Lower production-related energy consumption means an improved CO₂ footprint



A REVOLUTION IN AUTOMOTIVE MANUFACTURING

The project at the Fraunhofer Institute for Wood Research WKI is divided into three work packages: systematically building on each other, these address technical, ecological and economic evaluation. During the project, selected components will be mounted on a Porsche Cayman GT 4 Clubsport from Four Motors for testing and will be evaluated over the racing season. The tests have the advantage of examining extreme loads in a vehicle that is also available for the road. Cooperation with Porsche AG enables development process to unfold under the real-world conditions faced by automobile manufacturers.

Mechanical characterization of biomaterials and comparisons between various manufacturing processes demonstrate the potential for possible series production. A life-cycle analysis (LCA) addresses ecological and economic considerations by providing additional data over a component's entire life cycle.



One of the outcomes of this project is Porsche AG's market launch in January 2019 of its first series-produced racing car with body components made of biofibre composites. A mix of natural fibres is used in the new 718 Cayman GT 4 Clubsport's doors and rear wing.

Tradition and high-tech

A wide variety of plant fibres can be deployed to produce innovative biocomposite materials. Fibres from flax are utilised for the Bioconcept-Car. Clothing (linen) and other household goods, like cords, ropes and nets, have been made from flax for thousands of years.

Material engineers opt for flax-based fabric as it is readily available and has good tensile resistance, as well as being particularly fine, homogeneous, flexible and drapable. That ensures good adaptation of the fabric to component geometry. That helps ensure precise edges, which are crucial for accurate sizing and high quality in the components.

REAR WING

FRONT HOOD

DOORS

