High-performance additives drive sustainable composite innovations

Additive technology is becoming a key enabler for performance, process reliability, and more responsible material choices. Jan von Haaren, Global Head of End Use Thermosets, and Sven Kremser, Head of Global Communications, show how BYK's additives can help thermoset systems meet future demands.

Customers increasingly seek sustainable additive solutions and BYK's two-fold approach offers alternate routes to the one sustainability goal. The first approach is to provide the industry with data. BYK has been undertaking life cycle assessments (LCAs) of its additives for many years and data for a large section of the portfolio can be shared with customers. Additionally, portfolio sustainability assessment (product application combination or PAC analysis) has been introduced and the PAC analysis (byk.com/wbcsd) is applied for each new product development.

The second approach is to enable composites customers to use new processes and sustainable raw materials. These can behave differently from traditional technologies and the right choice of additives can help customers realise their aims.

Coupling agents

With innovative coupling agents, BYK helps bring more sustainable and compliant systems – such as recycled polyethylene terephthalate (rPET) resins or styrene-free unsaturated polyester (UP) resins – closer to the performance level of conventional materials. Composite parts based on rPET can vary in tensile strength, flexural strength, modulus, or glass transition temperature. The right coupling agent can compensate for these variations and, in some cases, even improve mechanical performance. As a result, more sustainable resin systems can be used without compromising technical requirements.

Use of recycled materials

The sheet moulding compound (SMC) and bulk moulding compound (BMC) industry is increasingly exploring how recycled material can be incorporated into new formulations by, for example, using milled post-use SMC. The challenge lies in the different surface properties of the recyclate: it consists of cured resin, fillers such as calcium carbonate or alumina trihydrate, and glass fibre fragments. When added to a new SMC formulation, it can affect wetting and dispersing behaviour, as well as viscosity. Wetting and dispersing additives help compensate for these effects, enabling 10-30% recycled content while maintaining the familiar processing profile of an SMC paste.

Wetting of natural fibres

Natural fibres can significantly improve the sustainability profile of composite materials, but they behave differently from established glass or carbon fibres. As natural materials, they show greater variation in surface properties, oil content, moisture level, and acidic surface groups. Reliable wetting and penetration of the thermoset resin are therefore essential. Additives to improve fibre wetting avoid dry spots and unwetted areas. A small amount of additive can optimise the performance of a natural fibre composite.

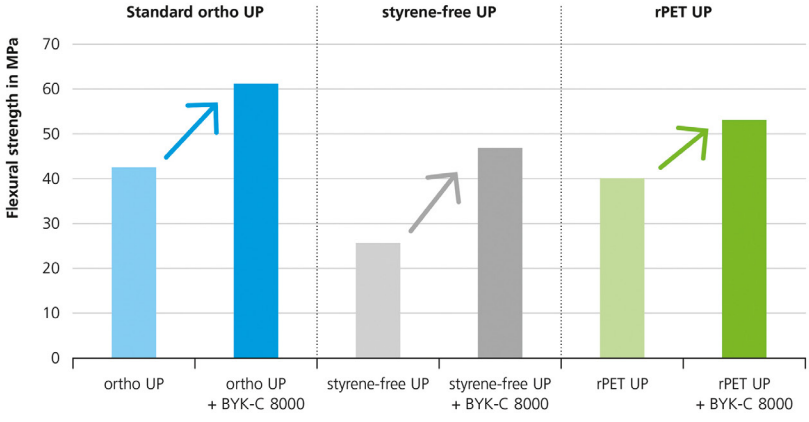
A proactive approach

PFAS-based chemicals are facing increasing regulatory scrutiny. The EU has moved far ahead in issuing new restrictions, while the US and several Asian countries are also tightening their regulatory frameworks. These substances can play specific roles as active additive components or catalysts in synthesis processes. BYK has offered PFAS-free additive solutions for the composites industry since the end of 2025. These include defoamers, air release additives and substrate wetting additives designed to deliver comparable benefits and performance without PFAS-based chemistry.

FURTHER INFORMATION

BYK: byk.com/plastics

BYK is a member of the European Alliance for SMC BMC.



BYK-C 800 coupling agent improves flexural strength in sustainable polyester resins systems with quartz fillers. (Source: BYK)