Interview with Frank Schumann of Trinseo

"Nothing Speaks against the Use of Recyclates for Demanding Components"

Automakers have formulated ambitious targets for lower CO_2 footprints of their vehicles. Hereby, plastics with a recycled portion play a key role. This topic we discussed with Frank Schumann, Global Segment Director Mobility at Trinseo. In the interview, he also talks about the current design trends for automobile interiors, and which battery type could become established for electric vehicles.

Currently, the automotive industry is going through more changes than it did for decades. The change to electric vehicles has triggered many modifications that are not limited to the drive train. There is also the demand from customers and politics for more sustainability. And even earlier, the trend towards more intelligent vehicles, up to autonomous driving, set the ball rolling in several areas. What effect these trends have on the materials used, was the question placed by Kunststoffe to Frank Schumann, Global Segment Director Mobility at Trinseo. Also covered during the interview were the latest lighting trends, and whether the plastics manufacturer will become a recycling company.

Kunststoffe: *Which design trends do you presently see for automobile interiors?*
Frank Schumann: At present, there is an enormous drive towards backlighting in vehicle interiors. Moreover, the electrification of components is advancing strongly. In addition, there is the trend to a "living room on wheels", combined with autonomous driving. Currently, lots of work in this field is going into driver attention alert systems. This is of great interest for the plastics industry, because it also requires backlighting.

Kunststoffe: *Is that a global trend?*
Schumann: Regarding backlighting, there are very large regional differences. In North America, individual switches are frequently still backlit. But in other regions of the world, so-called light guides are becoming established to a greater extent, i.e. unobtrusively integrated, only indirectly visible lighting elements. For example, they surround entire doors or dashboards. There is also a trend towards planar backlighting. These are behind textiles and also in plastic components. For the latter, transparent materials are required. How this backlighting can best be integrated in practice, is presently the subject of lively discussions. For example, it can also be integrated with films. Important hereby is that the components still meet all crash and safety-related requirements.

Kunststoffe: *Light on the exterior is also very popular at the moment.*
Schumann: Absolutely. Whereby, attention management is also very much in the foreground. Of course not that of the driver, but that of other road users. Exterior lighting design differs even more according to regions, as it also depends greatly on the applicable regulations. For example, this also applies for the permitted color spaces. Precise color hues are extremely important. And as a raw material producer one must frequently make use of the entire spectrum of adaptation possibilities for plastics. Not only for the color hue, but also in the way in which light is coupled out from a component. Sometimes it is important to create highly diffuse, homogeneous lighting. In Germany, the legal framework is very tight. Much of what would be technically possible, is simply not allowed, also not on a stationary vehicle. Therefore, it will probably take quite a while before illumination of all large panel surfaces is permitted in this country. The Asian market is far more interested in trying out new things, and taking customer wishes into account more quickly.

Kunststoffe: *You mentioned autonomous driving. What is the situation with the necessary sensors?*
Schumann: Sensors on vehicle exteriors is a highly current subject. Here, we have noted a steep learning curve with various OEMs. Many of them are following completely different concepts for the integration of sensors. Some are increasingly placing lidar and radar systems on the vehicle roof, others are integrating a whole range of sensors in the vehicle's front. And a third group relies completely on cameras, like Tesla for example. Of course, this also means that different types of plastic can be used. Overall, a 360-degree sensor coverage is required. It must be functional, have an appealing design, and be easily integratable –

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frequently without seams. As this is not possible with metal, it requires the use of plastics.

Kunststoffe: *Much is in flow also with batteries. Several manufacturers are testing very different structures and concepts.*
Schumann: At present there are very different designs and technologies on the market. Regarding materials, this ranges from simple mono-material concepts up to designs with very complex composite materials. The most exciting question is: Which design will prove to be the safest and most cost efficient version, and can also be suitably scaled for worldwide use in different battery sizes and capacities. In future, the produced quantities of vehicle batteries will be very high. Accordingly, the entire plastics industry is highly interested to participate. And therefore, strong competition is presently emerging between the companies, whereby each one tries to present its own strengths in the best way.

"Batteries with cylindrical cells seem to become a mainstream. The way they are packed is far more in question."

Frank Schumann

Kunststoffe: *And which battery type will come out on top?*
Schumann: It currently looks as if the mass market is tending towards battery types with cylindrical cells. The factories that are currently being built and their capacities speak in favor of this. However, this has not been decided. We still have to look into the crystal ball.

Kunststoffe: *Another important trend in the automotive field is sustainability, e.g. through the use of recycled materials.*
Schumann: Recyclates are nothing new in this field. They have already been used in vehicles for very long. But so far, automakers have used them exclusively to reduce costs. That is changing. We are presently conducting in-depth expert talks with all OEMs and tiers about recycled materials to reduce CO_2 emissions. Meanwhile, ecological balance and CO_2 footprint are established criteria. Just a few years ago, that was not the case. The greatest difference to the past is that recyclates were previously limited to less demanding components. But now, their application range is widening and also involves high-grade and high-performance parts.

Kunststoffe: *Is the demand for corresponding materials also increasing for you?*
Schumann: At the K 2019 we introduced high-grade PC+ABS blends with a recycling content. Meanwhile, these are already on the road, for example in door trims of a large German premium OEM. There, several kilograms of our materials are used per vehicle, and the feedback is very positive. One fascinating aspect is that materials for door trims must meet all crash requirements. This shows: There is nothing fundamental that speaks against the use of recyclates for such demanding parts. The challenge is simply to find the necessary high-grade basic raw materials. This selection process to find reliable feedstock sources is very tedious and so far has not resulted in a cost advantage.

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About the Interviewee

For 18 years, **Frank Schumann** has been involved at the intersection between the plastics and automotive industry. Since the start of this year, he is Global Segment Director Mobility with the plastics producer Trinseo, where he has been employed since 2018. Before that, he worked almost ten years for the automotive supplier IAC. There, Schumann was responsible for the further development of injection molding operations, amongst others. His career started in 2005 with today's Plastic Omnium Automotive Exteriors, who at that time was still called Dynamit Nobel Kunststofftechnik. Schumann studied material sciences at the Hochschule Bonn-Rhein-Sieg, and acquired his MBA at the Aston Business School in Birmingham.

Kunststoffe: *You offer the discussed PC+ABS blends with 30 and 50 percent recycling content. However, they contain only PC and no ABS recyclates. Is this a question of availability or are there material-related reasons?*
Schumann: That is correct. In our Pulse Eco blends we only use PC as recycled component. The maximum recycling con- »

tent is also limited by the recipe. We decided intentionally for this combination, simply based on the product's technical performance. Crash-relevant components such as door and A-column claddings have very demanding specifications – low temperature ductility for example. We therefore rely on the well-known very high performance of our virgin ABS Magnum as backbone of the recipe, because that is the most reliable solution.

"The supplied quantities of recycled plastics will not be enough to meet the needs of OEMs."

Frank Schumann

Kunststoffe: *Do you use post-industrial or post-consumer recyclates?*
Schumann: Both. We intend to make Pulse Eco the first global grade of a recycling-based PC+ABS blend for high-quality automotive interiors. For reasons of sustainability, it must be produced locally. Presently, we are introducing the material in China and the USA, based on Chinese and American recyclates respectively. But the availability of recycled PC varies widely regionally, and we cannot permit compromises in the technical performance. Therefore, we have not limited ourselves completely to these categories, but operate according to the recycling definition of the ISO 14021 standard and use external raw material sources.

Kunststoffe: *At last year's K you also introduced a bio-based ABS for vehicles. Did availability play a decisive role?*
Schumann: Up to the end of the decade, the supply quantities for mechanically recyclable plastics will not be enough to serve the sustainability goals of all the OEMs. At the same time there will be a fierce price war about the available materials. That is why we need alternatives, particularly for plastics that presently cannot be recycled mechanically in large quantities. This is where bio-based plastics come into play. They will be a transition solution until recyclates are sufficiently available. For several types of plastic, we also see chemical recycling as a possibility. That pays off especially with polymers whose energy consumption during chemical recycling is relatively low. Compared with the production of virgin material, this will greatly reduce CO_2 emissions. For us, this applies for PMMA as an example. Here, we are already very active in chemical recycling. For ABS and PC, on the other hand, we prefer a solvent-based, physical recycling method, also based on a potentially very attractive ecological balance.

Kunststoffe: *So the main factor is simply availability?*
Schumann: There is another aspect that plays a role. For high-grade and crash-relevant automotive components, bio-based plastics are a convenient option. As true drop-in materials, they equal the quality of virgin material and therefore require no technical and optical requalification.

Kunststoffe: *In the past years, you have entered various recycling cooperations, for example with JSW for chemical recycling of PMMA, and with Ineos for depolymerization of styrene, and you took over the waste disposal and recycling company Heathland. Will Trinseo become a recycling company?*
Schumann: Partially, yes. There is also a certain general market trend. Many companies have realized that due to the tight availabilities in the secondary raw material market they must keep very close to the sources. We deliberately go a bit further upstream. To ensure the qualities that we need, we want to collect and sort the plastics ourselves. The purchase of Heathland was only a first step in this direction. In future, one side effect of this could be that we also become partially active as a waste trader in that we sell wastes that do not have the quality we require. Solvent-based and chemical recycling are further elements that we need. Otherwise, we would not obtain the necessary quantities. ■

Interview: Florian Streifinger, editor