News Release

Module rack for Mercedes-Benz S-Class convertible made of continuous-fiber-reinforced thermoplastic composite

LANXESS subsidiary presents large-area structural part in thin-wall design

- **Replaces aluminum**
- **Reduces weight by 50 percent**
- **Numerous integrated functions**

Cologne/Brilon – With the help of continuous-fiber-reinforced, semi-finished thermoplastic composites, structural parts with a large surface area can be designed to be very thin and therefore lightweight. They can also be equipped with numerous functions, as demonstrated by a new module rack, only one millimeter thick, for the S-Class convertible from Mercedes-Benz. Various controllers are mounted on this component. The rack is fabricated in a hybrid molding process from Tepex dynalite 102-RG600(2)/47 %, a continuous-fiber-reinforced, semi-finished polyamide 6 composite from LANXESS subsidiary Bond-Laminates GmbH, based in Brilon, Germany. “The result is a component that weighs about 50 percent less than its aluminum predecessor. What’s more, the low weight and integrated functions simplify assembly, which is an additional cost advantage,” explains Julian Haspel, key account manager at LANXESS.

Joint development

The module rack measures 0.5 x 0.5 meters and is installed under the trunk. It was developed by Mercedes-Benz Cars Development together with several partners. LANXESS engineered the concept for the mechanical design of the component and calculated various load scenarios. Manufacturer of the module rack Pöppelmann Kunststofftechnik GmbH & Co. KG was responsible for the detail engineering of the component, such as function integration,

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development of the fully automatic, one-shot, hybrid molding process and component validation. The mold is manufactured by Georg Kaufmann Formenbau AG (www.gktool.ch).

Safe handling of the hot composite insert

“The rack could also have been fabricated in a simple injection molding process. But because of the part’s large surface area, that would have required thicker walls in order to keep the injection pressure sufficiently low. Although this would already have reduced the weight significantly compared to a part made of aluminum, there was still room for improvement,” explains Haspel. Therefore, to go even lighter, the hybrid molding process was selected. It involves a Tepex dynalite blank, which is heated, plasticized and shaped in a one-shot process, and then overmolded with Durethan BKV 30 H2.0, a glass fiber reinforced polyamide 6 from LANXESS. “Despite its size, the soft, hot blank can be handled safely and accurately positioned inside the mold. This contributes to a stable manufacturing process,” says Gregor Efes, structural component specialist at LANXESS.

More cost-efficient than aluminum

The hybrid molding process makes it possible to exploit the advantages of injection molding. For instance, screw bosses, clips, reinforcing ribs and guide elements can be integrally molded in the component. “The clips facilitate assembly, because they eliminate screw connections otherwise required to mount the controllers,” says Efes.

Even complex geometries are feasible in composite design

After successfully concluding the development project, LANXESS is now working with other system suppliers and car makers to implement additional, large-area module racks in a similar composite design. “Thanks to its high stiffness, strength and good draping

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properties, we also see good application opportunities for Tepex in bracket mounts, which display more complex geometries due to the confined installation spaces," says Efes looking to the future. In this context, all-plastic parts could offer the additional advantage of better damping properties (NVH: noise, vibration, harshness).

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