

## First exterior car part featuring honeycomb sandwich structure with a class-A film: Lightweight roof on the smart fortwo

### Case Study

With the polyurethane foam system Elastoflex® E from BASF it is possible for the first time to mass-produce an exterior car part featuring a honeycomb sandwich structure with a class-A film. The roof module in the standard model of the new smart fortwo consists of a paper honeycomb and two surrounding glass fiber mats. These are sprayed in an impregnation process with the low-density, thermally activable Elastoflex® E 3532 and pressed together with a solid-colored class-A film. A single operation thus produces a roof module which is around 30 percent lighter than the standard roof on the previous model – but retains the same strength and flexural rigidity. The lightweight roof was developed by Fehrer Composite Components, which manufactures it in its factory in Großlangheim, Germany.

For use in exterior components, BASF has adjusted the viscosity and reactivity of Elastoflex® E (semi-rigid polyurethane system), which was developed for the honeycomb technology, so that it can be optimally processed in each manufacturing step and shows good adhesion properties: It guarantees uniform, thin wetting of the glass fiber mats and does not drip. Once the semi-finished product has been impregnated, it is pressed into shape in a heated mold together with the class-A film. This causes the PU system to foam up slightly at the edge of the sandwich and creates a solid material composite between film, reinforcing mats and paper honeycomb core. A textile covering is attached on the inside.

The reactivity of Elastoflex® E has been adjusted so that long spray times of up to 120 seconds are possible for large-scale parts, along with short demolding times of up to 60 seconds. Moreover, decorative materials and films can be directly bonded or back-foamed in the mold as Elastoflex® E shows good adhesion to films.

