

Case Study

Airbag housing in nylon composite sheet hybrid technology

Over 30 percent less weight



Figure 1 Airbag housing with PA 6 composite sheet

In automotive design, polyamide 6 (PA 6) composite sheet hybrid technology is a particularly useful alternative to metals for reducing the weight of structural parts such as front ends, which are subjected to high mechanical loads. At the same time, it can be used to make all-plastic structures significantly lighter. One example of this is the housing for a passenger airbag module. The use of PA 6 composite sheet cuts the weight of the housing by over 30 percent compared with a mass produced, injection-molded version made of polyamide 6. The lightweight construction potential of PA 6 composite sheet hybrid technology can thus also be applied to plastic parts to considerably lower the weight and thus the emissions and fuel consumption of vehicles in the spirit of Green Mobility. The housing was designed as part of a joint advanced engineering project between LANXESS, Takata AG of Aschaffenburg, Krauss-Maffei Technologies GmbH of Munich, Bond-Laminates GmbH of Brilon and Christian Karl Siebenwurst GmbH & Co. KG of Dietfurt.

The airbag housing accommodates the gas generator and the folded airbag. Until now, such components were made mainly of steel, aluminum, or by the injection molding of thermoplastics. In this concept housing for the passenger airbag, the long side walls are

Grade: Durethan® DP BKV 240 H2.0
TEPEX® *dynalite* 102-RG600

Manufacturer: Takata AG, Germany

made of molded TEPEX *dynalite* 102 RG600 from Bond-Laminates. This nylon composite sheet of polyamide 6, reinforced with 47 percent continuous glass fibers by volume, is back-injected and reinforced in certain areas with Durethan DP BKV 240 H2.0, an impact-modified polyamide 6 copolymer from LANXESS. The design using PA 6 composite sheet hybrid technology enables the wall thickness of the side walls to be reduced from 3 to 4 mm to 0.5 to 1 mm, resulting in a considerable cost savings.

When the airbag is triggered in an accident, the base and walls of the housing must be able to withstand the explosion and the pressure during inflation of the airbag. Although the side walls are so thin, they can withstand the sudden pressure because of the high strength and stiffness of the hybrid PA 6 composite sheet. Composite sheet hybrid technology is generally suitable for all plastic automotive parts where high stiffness and strength need to be combined with low weight. Engine bearings are one example.

LANXESS can accurately simulate all process steps in the manufacture of PA 6 composite sheet hybrid parts – including the highly complex processes involved in forming the composite sheet. For the airbag housing, LANXESS is able to calculate the different local fiber alignments in shaped nylon com-

posite sheets in order to account for their anisotropic behavior at the part design stage. This expertise is part of the HiAnt brand, in which the High Performance Materials business unit has pooled the know-

how it has developed in materials, design, simulation and process technology to deliver tailored customer service.



The ability to save weight in vehicles by using plastics such as Durethan®, Pocan® and TEPEX® makes an important contribution to saving fuel and, linked to this, reducing CO₂ emissions.

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